

June 29, 1959

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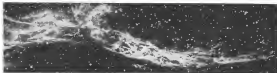


Curtiss's B-36 and the USAF Strategic Air Command combined to deter aggression and to prevent global conflict during the decade 1946-1955—the most critical period in all of history.

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RATE GYROS

TYPE 46-100 miniature rate gyro sensors consist of a wide operating temperature range without the use of heaters. The typical damping of 4 to 10 Hz is achieved without benefit of heat from the spin motor, and is held virtually constant up to a temperature of +150°F. The gyro spin motor will run on one (split), two, or three phase power, and is isolated from ground to prevent conducting ground currents. Write to *Radco Division for Bulletin 46-100*.



- Full scale range to 400 degrees/sec
- Theoretical resolution less than 0.01 degrees/sec
- Accuracy less than 0.1% of full scale to 10 meps, less than 0.5% to full range
- Damping: 0.2 to 0.8 from -10^2 to $+10^2$ Hz
- Shock and Vibration Approximate to 100 G
- Withstand: 10 G to 2000 cps
- Size: 1" diameter, 2 1/2" long
- Weight: Less than 0.5 ounce

TYPE 49 "Golden Clear" is in full production in a wide variety of different models, and has been proven in operational aircraft during the past two years. Because of its tested size and high performance it has been successfully used in a number of measures rate packages. Type 49 is a gold plated for improved corrosion resistance and points hermetic sealing. Write to *Radco Division for Bulletin 49*.



- Full scale range to 400 degrees/sec
- Theoretical resolution 0.01 degrees/sec
- Linearity: 0.1% of full scale to 10 meps, stable 0.5% to full range
- Damping: Field selected, temperature compensated
- Shock and Vibration Approximate to 100 G
- Withstand: 10 G to 2000 cps
- Size: 1" diameter, 2 1/2" long
- Weight: 3/4 ounce

TYPE 48 is particularly well suited for those applications where proven reliability must be combined with high performance. A rugged gold-plated sensor supports accurate high sensitivity and a wide full scale range under severe environmental conditions. The Type 48 gyro is available with heaters for those critical applications requiring maximum damping over the extreme operating temperature range of the instrument. Write to *Radco Division for Bulletin 48 and 48T*.



- Full scale range to 1000 degrees/sec
- Theoretical resolution less than 0.01 degrees/sec
- Linearity: 0.05% of full scale
- Damping: 18:1 to 1:1 from -10^2 to $+10^2$ Hz
- Jitter: 0.4 to 0.8 from -10^2 to $+10^2$ Hz
- Shock and Vibration Approximate to 100 G
- Withstand: 10 G to 2000 cps
- Size: 2" diameter, 4 1/2" long
- Weight: 1.0 lb.

GG19 is a descendant of the 30-7000 rate gyro and incorporates an advanced design and design features which adapt it to a wide range of applications. A wide selection of accessories including power-consumption, and damping ratios is available. The GG19 meets MIL-8-2173 requirements. It is available with one or two potentiometers. With a single potentiometer a rate switch operating at a predetermined turning rate can be included. Write to *Radco Division for Bulletin GG19*.



- Power Requirements: 115 volts, 400 cps, single phase
- Potentiometer Resolution: Available in any rate from 0.01 to 100 degrees/sec
- Theoretical Resolution: 0.1 degrees/sec at 10 cps
- Run up time: 5 minutes maximum
- Ambient Temp. Range: -45°F to +145°F
- Size: 4" diam, 3 1/2" wide, 5 1/2" high
- Weight: 1.75 lb.

LOW COST, GAS DRIVER GYRO

GG29 is an economical, low cost self-contained, 2 axis gyro designed for single-axis, short run use under high shock, vibration, and acceleration loads. A cylinder of compressed gas returns the rate and outputs the gimbal within 180 milliseconds after firing. The GG29 has less than 40 parts, is classified to withstand 100 G shock loads and 20 G vibration at 1000 cps. Request sample in design provide overall guaranteed reliability of 0.943. Write to *Radco Division*.



- Withstand Shocking/Free less than 100 milliseconds
- Rate: 0.5 degree per sec scale
- Output rate: Indefinite
- Lower rate heater: Defined in 2-48 degrees
- Size: 4 1/2" long, 3 1/2" diameter
- Weight: Less than 4 lbs.

Z AXIS GYRO

GG40 FULL PRECISION GYRO is a hermetically sealed, zero-drift, full-function gyro. Its all-aluminum rapidly results from the mounting of a compensated 2 degree of freedom gyro on a dual-gyro driver gear which adjusts proportionately between the free gimbal assembly (including and gimbal lock). It offers substantial savings in weight and complexity in flight control, fire control and all other military and non-military applications. Available with synchro, potentiometer or both. An electro-mechanical reset fire control system permits rapid repositioning of all drive potentiometers after missed during initial zeroing. Write to *Radco Division for Bulletin GG40*.



- Power requirements: 115 volts, 400 cps, 3 phase
- Zero drift: 10 minutes zero spread
- Gimbal location: 180 degrees in both longitudinal and transverse
- Initial motion in warm-up time: 1 minute maximum
- Motor rate: 0.5 to 10 deg/sec, factory adjustable
- Size: 4 1/2" long, 4 1/2" wide, 0.15 lbs. zero
- Accuracy: 0.15 degrees or better of true vertical
- Size: 1 1/2" long, 1 1/2" wide, 5 1/2" high
- Weight: Approx. 8 lbs including amplifier and potentiometer

GG44 RAR gyro has been specifically designed to withstand the severe environment of aircraft environments in carrier and missile applications. Finest than 100 parts, full monochrome gimbal construction and complete hermetic sealing chamber to insure high reliability and consistent operation under extreme vibration and acceleration loads inherent in missile flight. Separation shell body has proven reliable operation under shock loads up to 100 G. Write to *Radco Division for Bulletin GG44*.



- Power requirements: 200 volts, 600 cps, 3 phase
- Warm-up time: 30 seconds
- Precision rate: 100 parts at rates up to 10 deg/sec
- Gimbal system: Will read the gyro output in vertical up to 10 deg/sec without zero shift amplifiers
- Shock: Will withstand up to 100 G shock or more at pertinent requirements of MIL-8-2173A
- Size: 5 1/2" long, 4 1/2" wide, 4 1/2" high
- Weight: 4.5 lbs.

FLOATED GYROS

GG49 MG (Miniature Gas Driver Gyro) contains small size and light weight with high accuracy. It is a single degree of freedom gyro with fused-gimbal construction. Based on previous design and gyro construction experience with the HG-4, MG-4, and HG-4 gyro, the MG-4 offers basic data that it employs a "Dumb" construction system and large precision. It is particularly applicable for use in control system automatic platforms and in downstream control and control system. Write to *Radco Division for Bulletin GG49*.



- Power Input: 24 volts, 400 cps, 3 phase and 100 cps
- Zero drift: Accurate within 1 deg/100 limits acceleration maximum, after zero
- Non-accelerative constant: 1 deg/100 limits
- Shock: Will withstand shock in excess of 100 G
- Size: 2 1/2" long, 2" diameter
- Weight: 2.45 lbs.

WINGMAN MG gyro, only slightly larger than the standard MG, provides a small gyro with an upper angular freedom up to 180 degrees. Because of its wide input tolerance it is particularly adaptable to clipped down attitude reference systems, rate packages and fire control systems. The wide-angle MG also can be permanently magnetized under which allows keeping rates up to 10-100 degrees per hour. Write to *Radco Division*.



- Power Input: 24 to 1 volt, 50-400 cps
- Torque parameter: rate limit: 400 deg/sec (100 degrees/sec)
- Gimbal location: 180 degrees
- Input rate alignment: 2 m
- Operating temperature: 100°F to 150°F
- Size: 3 1/2" long, 3 1/2" diameter
- Weight: 0.7 lb.

GG57 GYRO is an advanced version of the Honeywell Slewlocking Gyro. It is a small, highly precise single degree of freedom control gyro specifically designed for missile platform stabilization systems and for inertial measurement systems. Performance features, though usually classified, are available on a need-to-know basis. Write to *Radco Division*.



- GG57 GYRO is a small, lightweight, hermetically sealed, single-axis gyro specifically designed to meet emergency rate requirements for platform stabilization and non-accelerative applications. It comes from the basic features of the HG-4 gyro with significant improvements in acceleration sensitivity and non-accelerative attitude drift (100). Detailed information covering the GG57 is classified.

For detailed literature write to *Radco Division or Radco Division or Radco Division*.
HONEYWELL ELECTRONIC SYSTEMS, 1111 STREET, NEW YORK, N.Y. 10020
HONEYWELL ELECTRONIC SYSTEMS, 2000 BROADWAY, NEW YORK, N.Y. 10008

Russia Revisited

Recently we conducted a 6,000 mi. trip inside the Soviet Union. The occasion was the 52nd General Conference of the Fédération Aéronautique Internationale for which the Glushko Central Aero Club of the USSR was the host. This was our second trip to Russia and occurred three years after we covered the visit of Gen. Nathan P. Twining and a group of top USAF officers to the Tushino air show and subsequent inspection of Red Air Force jet equipment, engine and armament factories, and military technical institutions.

At an early three rose interval we found considerable change in the Russian scene. The Glushko Central Aero Club did a superb job as host for the F.A.I. conference. Its president, Peter Struchinsky, was killed while gliding only a few weeks before the conference opened when the tow rope parted at his glider's tail. Much of the success of the conference was due to his preparatory work since the 1978 conference in Los Angeles. The club's vice president, E. N. Stepanov, who succeeded him as president, did an able job of carrying on as official conference host.

The conference also provided a fine opportunity for delegates from 30 countries to meet a large number of the Glushko Central Aero Club's working members and to see them in action at an interesting air show staged at the Tushino gun and rocket, the club's headquarters. It was evident to foreign delegates that the Glushko Central Aero Club plays an extremely important role in the huge state sport diving program in gliders, helicopters, lightplanes and parachuting that has been a vital part of the Soviet aviation picture in the past many years. This club has also been a spearhead of advanced aeronautical and astronautical development in the USSR in such recent fields as providing initial support for the current Russian space program and pushing development of reconnaissance and man powered helicopters at the other end of the technical spectrum.

As usual, when the Russians are hosts at an international conference, the hospitality was lavish. Official receptions by the mayor of Moscow, the Moscow Supreme Soviet, by Marshal Semyon Zhuravlev, deputy chief of Aeroflot, at the Red Army Club, by Min Jacques Goussau, F.A.I. president, at the Sovetskaya hotel, and by the Glushko Central Aero Club at its Tushino clubhouse provided a unique opportunity for the U.S. and other foreign delegates to meet many of the top technical people in Soviet aviation. Among those we personally met and talked shop with were Andrey Tupolev, dean of Soviet aircraft designers whom we first met three years earlier during Gen. Twining's visit; Alexander Yakovlev, whose design bureau turns out helicopters, sport planes and all-weather jet fighters; Sergei Tupolin, another veteran designer whose bomber and transport design got back to World War II and whose U-18 turboprop transport stands today as one of the finest of its type in active service; Mikhail Mil, the helicopter designer, whose design and personality and accent bear striking resemblance to those of Igor Sikorsky; Mr. Izhakov, whose 4,000 cph turboprop recently

won out in competitive field testing in the standard production model powerplant for the B-18 and An-10 transports; Prof. Andrey Krasovskiy, head of the space medicine program, and his assistant, Dr. Tatarskiy, and Col. Gen. Telov, head of DOSAAF.

Among the architects of Aeroflot's starting jump into the jet transport era we met V. V. Solodov, deputy chief of the foreign section, Peter Emersov, operations chief of the international division, Nikolai Gerdner, inspector general of the international division and two gentlemen occupying positions that we found difficult to believe would ever exist in Aeroflot: the public relations director, P. F. Soloviy, and his able and energetic deputy, Gregory Zankovskiy.

This was by far the largest group of top Russian aviation technical people that has mingled socially and professionally with a U.S. group. Despite the fact that nobody found out all they wanted to know, the experience was extremely valuable in filling in on some areas of mutual ignorance. This is the second time in three years that a group of top U.S. aviation people has been the guest of the Soviets and it is imperative that a Soviet group similar to the one we met at the F.A.I. conference be invited on a reciprocal visit to the United States soon.

The unorthodox objectives of the State Department to such a visit should be overruled by higher authority. We hope such influential U.S. delegates to the F.A.I. conference such as James Doolittle, C. R. Smith, Dick Bomer, Fred Crawford, Martin Daker and Tom Langpher will push vigorously their expressed intention to surround the State Department real block to such a visit.

There was a severe side to the Soviet scene, as there always is. While some aspects of Soviet life, particularly its consumer goods areas, have visibly improved in the three year interval since our last visit, other aspects have deteriorated. Corruption and harassment of U.S. and other news correspondents are much worse and the character of the police state on such closer to the surface, particularly outside Moscow. There is also an almost frantic official fear in the provinces of allowing any contact between Soviet citizens and foreign visitors out of the restaurant, hotel and sightseeing routine. This is coupled with a tremendous curiosity and interest in things American by these Soviet citizens whenever the official barriers to such contact are compromised.

In addition to our work in Moscow at the F.A.I. conference we flew 6,000 mi. around the Soviet Union as Aeroflot including its latest jet transports, the Tu-104B and the B-18. It is also typical of the changing Soviet Union that three years ago this trip would have been impossible politically or physically within the time span available to us. In the coming weeks we will report on these experiences both personally in the aviation field and personally in an average U.S. citizen abroad in the USSR without the restrictions of official Soviet communications imposed on all U.S. correspondents resident in Moscow.

—Robert Hartz



Flexible shield cuts glare in Voodoo cockpit

Without the special B.F. Goodrich Glim Shield, light from the instrument panel and radar screen would reflect on the canopy of McDonnell's night-flying F-101B Voodoo. But with this flexible shield, light stays where it belongs. The pilot and radar observer have an unobstructed glare-free view outside the plane.

During daytime flight the B.F. Goodrich Glim Shield works in reverse—absorbing the side glow of instrument from

head-on light. It also serves as a crash pad in the event the plane occupies wet runways.

Glim Shields are another example of B.F. Goodrich's versatility in fabricating fabric-reinforced rubber products to complex shapes and performance specifications. Now time you are faced with a similar problem, talk it over with B.F. Goodrich Aviation Products, a division of The B.F. Goodrich Company, Dept. AW-658, Akron, Ohio.

B.F. Goodrich aviation products



Micro and metal components, impact extracted from Alcoa Aluminum. The largest impact shown above has 4 in. diameter, 36 in. length. Alcoa can make them as large as 12 in. diameter, 60 in. length. The impacts shown are aluminum alloy L100, 6061 T6, 2024-T4 and 7075-T6.

WHAT'S NEW IN ALCOA IMPACTS?

IN A FIELD as revolutionary, pioneering and relatively new as impact extrusion, you'd expect progress to be made rapidly. And it has! In the years since Alcoa pioneered this breakthrough in the metal-working arts, the impact process has been advanced and extended to cover a wide variety of shapes and forms and material applications... to cut costs in dozens of ways... and to produce, in the wake of an eye, complex components with tolerances down to 0.005 in.

BACK OF THE IMPACTS shown above is in production. Each represents at least one complexity that formerly

would have posed a real production headache: each achieves the optimum properties of its particular alloy.

TODAY'S COSTS? With few exceptions, the cost of impact tooling is substantially less than for other fabricating processes. This is especially true where the length of the part would require several steps for other processes—but with the impact process, even extremely long parts can be produced with just one set of tools and one operation, simply by varying the size of the original blank or slug.

IN GENERAL, it's an excellent idea to

consider seriously any closed-end or tubular design as an Alcoa® Impact. For more specific information, and for on-the-spot assistance, the best procedure is to contact your nearby Alcoa sales office. Or, if you prefer, write to: Aluminum Company of America, 2000 T, Alcoa Building, Pittsburgh 22, Pa.

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Washington Roundup

Nuclear Plane Setback

Just Congressional Committee on Atomic Energy once again is scheduling public hearings—probably in the third week in July—on the aircraft nuclear propulsion program on which almost 50 billion has been poured since the end of World War II.

The more followed secret executive committee session last week, at which Thomas S. Gates, Deputy Secretary of Defense, and Dr. Herbert York, Director Department's director of research and engineering, made it "catastrophically" clear.

• That the Administration has abandoned any thought of a "fly early" program which would involve carrying for and with a prototype aircraft to house the nuclear system in the developmental stage, at the Puget Sound, Glendale, plant of General Electric Co. Airframe, contractor is General Electric of General Electric Corp.

• That there will be a major shift in emphasis from the aircraft propulsion system now in advanced development, to research and development on new materials and reactors for a more advanced system.

Committee members, led by Rep. William Price (D-Ill.), chairman of the subcommittee on research and development, who have previously advocated a program to put a nuclear powered plane in the air, scheduled public hearings in February (AW Feb. 16 p. 37). These were postponed when further sessions and hearings indicated that the late Deputy Secretary of Defense, Donald Quarles was in the line of appearing in an anticipated ANP program on the eve of his death. Price said he considers the new Administration plan to concentrate on new materials a "step backward" from the status quo.

Navy has publicly criticized the Air Force project at General Electric which withdrew the aircraft nuclear engine. Navy is working on an indirect cycle nuclear engine. Pratt & Whitney Division of United Aircraft Corp. Vice Adm. J. T. Hayward, deputy chief of naval operations for development, recently told the House Appropriations Committee that USAF's ANP program was "a commitment to lose out to get a technical program" which "is still a pure program with little hope of being realized." Price wants the Navy project, as well as the USAF "fly early" program, pushed.

Open Competition Policy

Industry will seek higher-level clarification of Air Force policy on weapons system issues building following a USAF decision late last week that Douglas Aircraft Co. must hold an open competition to select an engine contractor to supply guidance and control for its new low-level high-speed, variable-wing, "Strike" fighter, says a winning proposal (AW May 11, p. 34) indicated properties guidance and control concept which it and General Electric had worked out through months of joint effort prior to the bid and General Electric was included as a prime candidate manager in the Douglas proposal. Now the Air Force has told Douglas that it will not accept GE in the role without a severe selection competition.

Flight Proficiency Costs

Department of Defense is pushing a proposal to cut the aircraft cost of military proficiency flying by cutting the cost of biggest one-day operations and maintenance at the aircraft. Officials also have had flying costs for 20

years or more could continue to drive flight pay without performance credit flight programs. The also would be line of officers assigned outside the U.S. as in Alaska where it is impracticable to participate in flights regularly.

NASA Scrutiny

Contracts and contracting procedures of the National Aeronautics and Space Administration are going to be scrutinized by the House Committee on Science and Astronautics, according to Rep. Charles Brooks (D-La.) chairman. Brooks added that one study, in cooperation with the U.S. Congressional Council, is already under way with regard to the \$10 million NASA contract with the Rockwell International of North American Aviation, Inc. for development of 1.5 million lb thrust engine.

Travel Tax Repeal

Supporters of proposals to eliminate the 30% tax on travel are not too optimistic over the possibility of favorable congressional action during the current session, despite the facting the Senate will again approve repeal. The strong stand taken by the House last year blocked attempts to repeal the travel tax, although in compromise Congress did accept elimination of the 20% tax on cargo. Even though the House is not as strongly committed this session and might possibly approve the measure, public support for repeal has not been overly strong, thereby reducing its chances.

Transportation Policy Probe

Senate Committee's investigation of transportation policy is progressing slowly. Air Transportation Act and five other transportation subcommittee-reporting subcommittee, research group, business, flight research and other subcommittee have been asked to conduct a consultant to participate in the work program. AIA last week had not yet decided on its recommendation. The study, which has already been voted \$10,000, would evaluate the impact of general aviation policy toward the various types of transport and consider the question of ownership of air force of transportation by state.

CAB Denies Discounts

Domestic airline industry's bid to allow reduced rates on regularly scheduled flights around round-trip flights from airports by the Civil Aeronautics Board. The request does not amount to a full discount on the full amount, which only for a 50% discount on stand and fees, since the Board has issued certain conditions which must be met before the rate will be reduced. For example, the request has been asked to force more general aviation airports once which the firm will be able to finance the event fees that will be applicable under the reduction rather than an airframe-board percentage. Again, Airlines are anxious to reduce the discount on flights to hotel airports controlled by the Air Traffic Control because of the growing amount of business these airports are generating through the U.S. for the industry.

—Washington staff



EIGHT HURRICANES pull out of formation during bomb-burst at the Petit air show. Remaining six made second pass, pull up and come into bomb-burst and break out the horizon.

French and British Teams Star at Paris

By David A. Anderson

Para-Spectacular demonstration by the Swedish Sub Division and some rapid firing by French and British anti-aircraft teams and this 25th (International) Aeronautical Salon from being just another air show.

Both days of the flying display were marked by dark skies, ground haze and thunderstorm activity around Le Bourget Airport. Weather kept USAF activity to a minimum. Curtains, rising, revealing the Cessna 1-102A, all-weather fighter, warbirds, from the show on the second day after being out for a while. Sixty-two teams took only one pass at the field before packing off for landing.

But the French and the British acrobatic teams flew both days, using the

lightest. These acrobats show airplanes and drivers from the delighted crowd. The USAF introduction got lost.

The double delta Division, first in wing

One-Upping Tupolev

André Tupolev, dean of Russian designers, wanted all eyes on the new display of the Paris air show, taking photography and being photographed. At the flying show he climbed with one-way, dual engine engine. Groups behave. Trying to get one up on the Russian, Schmitt told Tupolev that the wing was taking in one model on a Vach 1 mission. Tupolev shows the last on the floor with an expression of combined amazement and disgust and shouted: "You will lose your shirt!"

Meanwhile, in Sweden Ottoborn, showed extreme high speed maneuverability and one of the highest approach patterns flown by any aircraft—piston-engine or jet—in the show. Rate of roll was very high. Turns were very tight, and the high speed runs were the fastest of the show. Ottoborn demonstrated not only the excellent handling characteristics of the aeroplane, but also his own competence as a pilot.

French acrobatic team was from the 11th wing at Dijon, flying Dussault Morane 45 dive fighters. On the first flying day, their routine was staged at the start, and they were performing at once distance from the field. But the second day they lightened up beautifully, and produced one of the most spectacular bomb-bursts ever seen at an aviation

NINE HAWKER HURRICANES from RAF 111 Squadron formed one of two groups led by the unit for the Salon flying display. A group of five Hurricanes showed its pass over the GSA, yielding about continuous aerobics before a planned crowd.

The team used red, white and blue smoke to trace their patterns in the sky. For the final maneuvers, three Hurricanes held a tight turn evaded leaving a red, white and blue circular trail. The wingman team, which had prior the main portion of the aerobics show, looped into this, coming over the top into a bomb burst which carried the model of France in all directions to the horizon.

Royal Air Force 111 Squadron fielded the color unit in two teams of two and five Hawker Hurricane Mk. 6a fighters respectively. Technically, the squadron flew better than the French demonstration were a little lighter patterns a little more precise. But the French are men with showmanship.

British Teams

One of the two teams by 111 Squadron kept one group always in front of the crowd. All 14 black Hurricanes were lined up in the runway and took off in two groups, one nine-man and one five-man and, before the first group was into its pass, they had all been a tight diamond and were heading back at the field to begin the demonstration. For routine changes were well handled, and only once or twice were gaps visible as the planes moved by.

Three bomb-burst conclusions was a variation on the home theme. The first team of nine did a diamond burst strutting all over 40 deg. for the hour. Ten five-man patterns, turned the remaining five to do an angled bomb-burst through the ends of the field. Final two passes at the field were made by the extra formation of 14 flying a shallow V with five in the bow. They looped up and over with another bomb-burst, with the outside nine pulling off, and then the remaining five



NINE DUSDAULT MORANE 45 dive fighters from the 11th Wing at Dijon from a tight box, during one pass of their aerobics routine. Planes are marked with tricolor of France, red, white and blue smoke in wave patterns in the sky.



DASSAULT MIRAGE 3 with SEPE cockpit pack for military power demonstrated on vertical climb and hot flyby.



NORD GRIFFON lights off carpet for high speed run.



TAIL HOOK DRAGGING, Ormuskil Extended 04 prototype comes in for landing. Swedish Sisk Dronin (below) lifts all variety in legs but individual performance of entire Farn show. Flown by Brylen O'Brien, the little double-delta showed amazing maneuverability at high speed.



completed a second loop and horizontal.

Both teams led alternately from left and right into the landing pattern, with Herten coming in over the threshold about 6 sec apart.

Another highlight of the flying display was the formation, but almost certainly, leading of the English Electric P10 by R. P. Bennett, chief pilot for the company. Bennett got off the ground and onto a steep better than an other demonstration pilot, and then holds tight turns well within the sight of the crowd. "He's a good" and one technician, and the landing seemed to be a lot better. The P10 was shown in front of the crowd, and the 1g turn ended successfully in a brief of afterburner power showed the considerable maneuverability of this plane at very much less altitude.

USAF Participants

USAF: 60th of the Century saw North American F-100 in the Silverthorn town, making their 512nd and 514th demonstrations, and one each of the McDonnell RF-101, General F-102A and Lockheed F-104B. Best performance of the lot was the RF-101, which beat off the contest of a fast-late late of climb and handled well in high speed passes. The F-101 was a well seen as other aircraft would to Boeing AFB in Germany, by way of the Alaska Defense Command. Its pilot was perfect, and its appearance as sharp contrast to the early color schemes of Silverthorn, Northern in Herten.

Regret disappointment was the Lockheed F-104B demonstration, flown by Lt. Col. James J. Hahn. The plane made only a takeoff, a single flyby and a landing.

Miss observers criticized the poor showing made by USAF on the second day of the display. Weather was undoubtedly a factor, but it didn't seem to bother anybody else interested in demonstration. And on the 10th the second day, American exhibitors were leaving that the F-104 would make a blistering run to put the Deke, Herten and over the age. Hahn left Herten in their proper place. But it never happened.

The flying display was scheduled by timetable, instead of as timed entry. Then came that it was again damaged out of the display, the left a guy of several minutes during which nothing happened. To fill the time gap control the withdrawal of the USAF on the second day, a guest Douglas C-119 flew repeatedly past the crowd. In about the 11th pass, it was getting rather noticeable.

Many people at the show criticized the timing and felt that too much had been scheduled. Displays began at 10 a.m. with light planes, and lasted until

7 p.m., with time out for lunch. Traffic control left something to be desired and some of the pilots. Herten's Bill Bedford, flying a Hunter two-seat trainer, was recovered into the wing canopy for a high speed run which he did beautifully but in the last hours.

B-18 Impressive

Roman flew the Tu-104 and the B-18. The B-18 design impressed everybody with its sleek lines, its clean lines during the flyby and the gentle landing. Torgolev's big Tu-114 didn't fly. The Roman said that there wasn't a tractor big enough to drag it from the parking area to the apron. But when the plane headed at Lt. Bennett, a standard tractor moved it into the parking area.

The Tu-114 was rolled with engine cranks, stopped with dented holes at



DASSAULT COMMANCHE is light house transport also available in attack aircraft version. Earlier version is called Spide.



ITALIAN AGUSTA A28 is helicopter prototype. Flown has been ordered to prototype quantities for British Air Force as executive transport.



BPSGUT INTEGRAL 740 demonstrated STOL characteristics at Le Bourget. Max Herten Super Romanoff (below) introduction and high speeds, across up to 15 people.



Russians Reveal Tu-104B Operating Costs

Paris—Five 41 days of Aeroflot 109 program Tu-104B per transport operation on the Moscow Leningrad route made the company a net profit of 4, 212,120 rubles.

Cost data identical at a price run because held by the airline during the 21st International Aeronautical Salon here is the first ever made available by the Russian company.

Such data is difficult to make because of the problems of trying down the real value of the ruble. Official U. S. dollar exchange rate is 4 rubles to a dollar, tourist rate is 10 to 15 and black market 20 to 1. Furthermore, cost figures which include maintenance of Russian built aircraft are also obvious, somewhat, but comparable to those for an American or British or French transport.

Even for the figures for the operational period between April 15 and June 3, 1959. Route between a 641 mi., scheduled time is 55 min., while gave a block-to-block speed of 681 mph. Fast, presumably max was 130 mph. During the 21st pass 214 road trips were completed.

Aeroflot says 42,554 passengers were carried which averages to 90 passengers per trip. Mail load was 51,000 lb., and total freight lifted was 1,946,000 lb. Company was the result of a 97,500 coefficient of utilization, which was not met correspond to an even all airplane load factor.

Total number of ten miles flown was 1,972,000. Receipts per mile more than rubles 15 receipts. Direct operating cost including maintenance was given as two rubles 56 kopeks. Net profit was 42 kopeks per ton-kilometer is equivalent to about 61 kopeks per ton-mile.

French Order H-34s, H-21s

Para-French procurement, because of urgent and important operational needs in Algeria, has decided to purchase additional quantities of heavy helicopters in the United States.

Involved in the new order are 27 helicopters, plus spares, at a total cost of some \$15 million. The French are known to get 19 Sikorsky HH-43s while the British may wish to take eight additional Vertol H-12s.

To get primary funds the government shouldered other types of armament orders plus construction of a new submarine. The National Assembly approved the government's request to make the credit transfer, despite the fact that some military observers felt the French already have more heavy helicopters in Algeria than can be used effectively.

Prior to the new order, the French had placed orders, now largely filled, for 71 Sikorsky and 140 Vertol helicopters. In addition, 150 Sikorsky helicopters are being built under license in France by Sud Aviation. Of this batch, 40 have been delivered. There are 14, at the end of June, the French are operating a fleet of 324 heavy helicopters, most of which are involved in the Algerian conflict.

Despite such deliveries, the Algerian military command estimates it will have only 150 heavy helicopters available by December. The rest are involved in training or have been knocked out of action in combat. To meet pressing needs in Algeria, the 27 helicopters ordered are divided between Sikorsky and Vertol so the total order could be delivered during July.

Assembly delays brought out one reason why the French government had to spread payment dates for American helicopters. After originally placing for 150 Sikorsky helicopters with Sud Aviation, the government asked this figure back to 80 in September, 1972, and still to reduce the balance until August 1974.

As a result, Sud actually produced only 100 of the HH-43s, 25 in June and 75 in July, 1969. But, meantime, to meet current demands by the French military in Algeria, the government was obliged to turn to U.S. manufacturers.

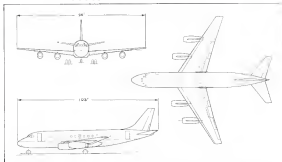
West Germans to Design Weapons

Rome-Denver. Minister Gianni Josif Strauss and the third phase of the Luftwaffe buildup will be marked by introduction of German-designed equipment. As a speech to the German Aircraft Industry Association in Bad Godesberg, Strauss referred to as home missiles, a 30 ton helicopter and a medium aircraft troop unit in possible projects.

The secretary of defense said that third phase, which is not yet begun, must be viewed not as competition in the other members of NATO. The old idea that German soldiers must be armed only with German weapons is passed, he declared.

In contrast to his speech to the assembly a year ago (AW, June 9, 1971, p. 21), Strauss made no mention of competition. He explained that the first phase of Luftwaffe buildup was a request to purchase of F-4s, F-6s, F-8s, F-105s, F-106s, F-108s, F-109s, F-110s, F-111s, F-112s, F-113s, F-114s, F-115s, F-116s, F-117s, F-118s, F-119s, F-120s, F-121s, F-122s, F-123s, F-124s, F-125s, F-126s, F-127s, F-128s, F-129s, F-130s, F-131s, F-132s, F-133s, F-134s, F-135s, F-136s, F-137s, F-138s, F-139s, F-140s, F-141s, F-142s, F-143s, F-144s, F-145s, F-146s, F-147s, F-148s, F-149s, F-150s, F-151s, F-152s, F-153s, F-154s, F-155s, F-156s, F-157s, F-158s, F-159s, F-160s, F-161s, F-162s, F-163s, F-164s, F-165s, F-166s, F-167s, F-168s, F-169s, F-170s, F-171s, F-172s, F-173s, F-174s, F-175s, F-176s, F-177s, F-178s, F-179s, F-180s, F-181s, F-182s, F-183s, F-184s, F-185s, F-186s, F-187s, F-188s, F-189s, F-190s, F-191s, F-192s, F-193s, F-194s, F-195s, F-196s, F-197s, F-198s, F-199s, F-200s, F-201s, F-202s, F-203s, F-204s, F-205s, F-206s, F-207s, F-208s, F-209s, F-210s, F-211s, F-212s, F-213s, F-214s, F-215s, F-216s, F-217s, 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F-1415s, F-1416s, F-1417s, F-1418s, F-1419s, F-1420s, F-1421s, F-1422s, F-1423s, F-1424s, F-1425s, F-1426s, F-1427s, F-1428s, F-1429s, F-1430s, F-1431s, F-1432s, F-1433s, F-1434s, F-1435s, F-1436s, F-1437s, F-1438s, F-1439s, F-1440s, F-1441s, F-1442s, F-1443s, F-1444s, F-1445s, F-1446s, F-1447s, F-1448s, F-1449s, F-1450s, F-1451s, F-1452s, F-1453s, F-1454s, F-1455s, F-1456s, F-1457s, F-1458s, F-1459s, F-1460s, F-1461s, F-1462s, F-1463s, F-1464s, F-1465s, F-1466s, F-1467s, F-1468s, F-1469s, F-1470s, F-1471s, F-1472s, F-1473s, F-1474s, F-1475s, F-1476s, F-1477s, F-1478s, F-1479s, F-1480s, F-1481s, F-1482s, F-1483s, F-1484s, F-1485s, F-1486s, F-1487s, F-1488s, F-1489s, F-1490s, F-1491s, F-1492s, F-1493s, F-1494s, F-1495s, F-1496s, F-1497s, F-1498s, F-1499s, F-1500s, F-1501s, F-1502s, F-1503s, F-1504s, F-1505s, F-1506s, F-1507s, F-1508s, F-1509s, F-1510s, F-1511s, F-1512s, F-1513s, F-1514s, F-1515s, F-1516s, F-1517s, F-1518s, F-1519s, F-1520s, F-1521s, F-1522s, F-1523s, F-1524s, F-1525s, F-1526s, F-1527s, F-1528s, F-1529s, F-1530s, F-1531s, F-1532s, F-1533s, F-1534s, F-1535s, F-1536s, F-1537s, F-1538s, F-1539s, F-1540s, F-1541s, F-1542s, F-1543s, F-1544s, F-1545s, F-1546s, F-1547s, F-1548s, F-1549s, F-1550s, F-1551s, F-1552s, F-1553s, F-1554s, F-1555s, F-1556s, F-1557s, F-1558s, F-1559s, F-1560s, F-1561s, F-1562s, F-1563s, F-1564s, F-1565s, F-1566s, F-1567s, F-1568s, F-1569s, F-1570s, F-1571s, F-1572s, F-1573s, F-1574s, F-1575s, F-1576s, F-1577s, F-1578s, F-1579s, F-1580s, F-1581s, F-1582s, F-1583s, F-1584s, F-1585s, F-1586s, F-1587s, F-1588s, F-1589s, F-1590s, F-1591s, F-1592s, F-1593s, F-1594s, F-1595s, F-1596s, F-1597s, F-1598s, F-1599s, F-1600s, F-1601s, F-1602s, F-1603s, F-1604s, F-1605s, F-1606s, F-1607s, F-1608s, F-1609s, F-1610s, F-1611s, F-1612s, F-1613s, F-1614s, F-1615s, F-1616s, F-1617s, F-1618s, F-1619s, F-1620s, F-1621s, F-1622s, F-1623s, F-1624s, F-1625s, F-1626s, F-1627s, F-1628s, F-1629s, F-1630s, F-16

AIR TRANSPORT



WINGSPAN of 94 ft, length of 101 ft, and tail height from ground of 34 ft are dimensions of proposed DC-9. Douglas says the jet transport could be in service in 1983. Operating economy is equivalent of 54-passenger DC-8B for stage lengths up to 1,500 mi.

Douglas Reveals DC-9 Performance Data

Four Pratt & Whitney turbofan JTF10A-1s will power 68-92 passenger short-medium haul airliner.

Stuart Mauser, chief-Douglas Aircraft Co. has formally unveiled a four-turbofan, 68-92 passenger DC-9 in the short-to-medium haul air transport category. It could be in service in 1983. Backed up now in the hands of potential customers. Design will be released for production of and sales. Douglas promises 75 to 340 "complete construction" from buyers. The numbers are deliberately vague, but also obvious are convinced that the go-ahead signal will be issued soon. (See p. 35)

Acceptable "conversion" apparently means production could be based on something less than firm orders of the potential buyers as in good standing, says Douglas.

A note of low production engineers is already working in conjunction with the advanced design while awaiting the word to start final engineering. Most of these men will lead design groups or hold other responsible positions when the airplane is engineered for production. Fabrication and assembly will be centered at the Douglas Long Beach plant along with the DC-8 to take ad-

vantage of same manufacturing tooling and to take up some of the slack when DC-8 production tapers off from the natural run to a natural level.

Feeling can be shared most notable around the nose and cockpit windows, section which is identical to the two places. Aerodynamic shape of the wing is still identical. Douglas is emphasizing flexibility of operation in the new design.

The DC-9 will carry 55 forward passengers in either new seat or previous DC-8 all-transporter at speeds equal to that of the larger DC-8.

Span of the DC-9 is 94 ft, length is 101 ft and height of the tail

is 34 ft from the ground. Maximum takeoff gross weight will be 120,000 lb. This compares with the 117-ft span, 106-ft length and 29-ft height of the 107,000-lb DC-8B.

From short ranges up to 2,500 mi. the operating economy of the new Douglas jet offered for service in 1983, is equal, close to that of the 54-passenger DC-8B.

Pratt & Whitney Aircraft JTF10A-1 four turbofan develops constant 3,210 hp thrust at sea level up to a 56°F day. This arrangement contributes to higher rates of climb to cruise height and results in a reduced advantage in second levels. Another advantage is low specific fuel consumption, about 1.9% less than that of ordinary jet engines.

Wing sweep of 18 deg and proper-ness of the control and stabilizing ac-

tion follow those of the larger DC-8. The DC-9 has leading edge slots which are mechanically extended and locked into position when flaps are retracted. These high mach devices reduce the bleed and leading edge height to values equal to or less than those of the DC-8B.

At maximum takeoff weight the new jet will carry its full-term payload a distance of 2,500 mi. at points to point speeds of more than 520 mph. Additional range is available at a slight reduction in speed. At shorter ranges the cruising speed is over 550 mph. Normal cruising altitude will be up to 35,000 ft.

Since structural loading weight provided is 11,000 lb. greater than the actual loading weight with a first-class payload and normal fuel reserve, the DC-9 is able to operate under more severe stresses without reducing at each step, Douglas claims.

Self contained staircases at the forward passenger entrance permits rapid loading and unloading of extra-large cargo. Second passenger door for roll-up cargo is located at the rear of the cabin to speed ground operations at major airports.

DC-9 will accommodate the Palomar airfield seats developed for the DC-8, four abreast in full-size arrangements and five abreast for coach service.

First-class first-class seats are on a

DC-9 Data

Core—close to five plus other attributes. Capacity—passenger cabin is low air signature. Up to 92 passengers in each version.

Cargo—600 cu ft and 9,100 lb.

Dimensions:

Span—94 ft.

Length overall—101 ft.

Height—34 ft.

Wing sweep—18 deg.

Cabin entrance—75 ft long.

Cabin entrance width—124 in.

Cabin entrance height—52 in.

Area:

Wing (including slats)—1,203 sq ft.

Leading edge—fully retractable (excepting two sets of dual type shock and a variable type nose wheel).

Total of main wheels—14 ft.

Wheel base, main and tail—12 ft.

Powerplant—Pratt & Whitney JTF 10A-1.

Takeoff power (static thrust)—5,210 lb. (56°F).

Weights:

Maximum takeoff—120,000 lb.

Structural design loading—65,000 lb.

Payload—20,150 lb.

Zero fuel—87,000 lb.

Performance—68 First Class Passengers & Baggage

Range (mi.)	55	600	750	1,000	1,500	2,000
Takeoff weight	110,000	121,000	130,000	141,000	152,000	163,000
Max. takeoff length (ft) to the threshold	4,400	4,400	4,400	4,400	4,400	4,400
Max. takeoff length (ft) to 100 ft	4,400	4,400	4,400	4,400	4,400	4,400
Max. landing length (ft)	3,100	3,100	3,100	3,100	3,100	3,100
Max. landing weight	110,000	121,000	130,000	141,000	152,000	163,000
Max. landing length (ft) to 100 ft	3,100	3,100	3,100	3,100	3,100	3,100
Max. landing weight	110,000	121,000	130,000	141,000	152,000	163,000
Max. landing length (ft) to 100 ft	3,100	3,100	3,100	3,100	3,100	3,100
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Max. landing weight	110,000	121,000	130,000	141,000	152,000	163,000

35 in. pitch. Forward seats are five abreast for 92-passenger coach. Most passenger configurations for 75 passengers is three abreast, aisle arrangement.

First-class seating configurations has an aisle width of 27 in. and the passenger seating provides a 16 in. aisle width.

The cockpit is arranged for either a three or four man crew, with space available for a fifth person if necessary.

Forward and aft passenger doors are 54 x 72 in., right hand cabin service door is 35 x 64 in., and right hand emergency exit is 34 x 68 in.

Cargo pit length is 47 ft. Cargo volume of 600 cu ft is partitioned to the same values at the cabin. Forward cargo pit doors are 36 x 45 in. and aft pit doors are 45 x 53 in.

The space behind the forward of the DC-9 is based on 18 ft per row. If a full cabin thermal payload of 17,710 is carried, more than 2,270 sq ft. of full weight payload of 12,155 is carried, more than 1,480 sq ft.

Flared wings for the DC-9 permit high cruising speeds and simplified cockpit procedures. Cruise speed plus cost is a combined 450 mph equivalent.

Above 15,000 ft. altitude speed is greater than speed capabilities at sea level cruise thrust.

At altitudes between 15,000 and 20,000 ft. true airspeed grows then 400 mph can be achieved.

Reduced stage capabilities (ability to take off and fly) in additional segment or segments without reducing and to land with normal reserves of the DC-9 is 150 sq ft.

Box all wings, the DC-9 offers a low stall advantage of 200 mph over other airplanes and 100 mph over the turboprop type.

Forward passenger load extended for the 68-passenger DC-9 is about 47 (55%) for a 500-mph stage; 55 (51.5%) for a 1,000-mph stage and 55 (51.5%) for the maximum stage of 2,000 mph.

By comparison, the DC-8, with a 118 sq ft wing capacity, is rated to handle only 58 passengers (48%) at the 500-mph stage, 67 (56.5%) at the 1,000-mph stage or 67 (56.5%) at the 1,500 mph stage.

Northeast Completes 707 Jet Lease Pact

New York-Northeast Airlines has completed a lease agreement with Trans World Airlines that will permit the carrier to introduce Boeing 707-113 service on the New York-Miami route in each September.

Initial operation of the leased aircraft will include one round trip night flight. Later, the airline will increase its schedule to three round trips daily in all four time slots to meet the peak Florida traffic season. Winter schedules will be operated with Boeing 707-333 turboprops if deliveries of the new planes to TWA conform to present delivery schedule.

The lease agreement, which includes use of TWA crew, will place Northeast well ahead of its two competitors in the turboprop competition race on the New York-Florida run. National will remain its current lease through winter, the fourth of the season.

Eastern plans to start its Douglas DC-8 turboprop service next week. Northeast will start its own flight next to take over flight operations from TWA at the end of the season.

Overhead work will be handled by TWA.

Lower rental costs will amount to \$1.10 per enroute plane-mile based on a 100-mph cruise stage length factor.

Boeing Nears 727 Decision

Boeing Aircraft Co. is conducting a follow-up study, looking at development of a Model 727 short range jet. Several configurations are being considered by Boeing's transport division with few details expected to be reached soon.

The airplane probably will be designed to carry 50-60 passengers. Another Work has shown that a possible configuration will be powered by turbofan engines, using only two, mounting greater than increments for these engines over those in a three-engine configuration. Boeing also had studied those with four engine layouts.

Smith Questions Mach 2 Transport Cost

By Robert H. Cook

Tube-Proponents of existing turbojet transports for the foreseeable future are complaining to Aerospace Industries Council C. R. Smith through derivation companies here for the cost of a new \$20 million jet motorhouse and engineering center.

Answering queries on the expense of the feasibility of Mach 2 transports, Smith advised that predicted \$150-million price tag for expensive aircraft was not available until the cost of one engine was fixed. He also questioned whether airline passengers would be willing to pay the necessary additional fuel cost each second when they could travel at today's 500 mph jet speeds for about half the cost.

Further limiting jet speed increases, he said, are current air traffic control problems which periodically affect direct and maximum line operations. "Traffic congestion and attendant aircraft delays over such routes as New York to Washington or New York to Boston produce point-to-point times under schedule, regardless of the type aircraft being used," he pointed out.

"It makes no difference whether you travel between airports at 550 mph or 500, since traffic is so heavy, that the speed advantage is nullified," he explained.

Smaller Jets

Early experimental experience with the Boeing 707-120 has shown that, while it is ideal for the short haul, it is a "big airplane to fly" on medium length routes, according to the airline president. Future air travel needs will call for smaller type jets in substantial volume to provide more frequent scheduling, he predicted.

Expected cruise speed of 575 mph for the 707-120 has proved "a little bit disappointing," he said. "American has found direct operation between an average cruise speed of about 500 mph. Daily utilization rate of around 6 hr has been due to the necessity for carrier changes expected during the initial phase in the aircraft and should increase a planned 8 hr daily utilization in the next phase, Smith said. Less than half of the airline's jet flights have arrived on time since the 707-120 and Lockheed Electra turboprop service was introduced, he said, but some airlines still frets at the associated lower problems with these than other types.

Smith cited modifications to the turbo-propeller pumps and under wing fueling systems on the Boeing 707-120 and proposed changes on the Lockheed Electra as examples of early maintenance

problems. Another major model entry to the Electra known as "Opinion 101," will soon get under way with a three-degree rise in the angle of engine attack, plus a change of propeller timing phasing, a modification designed to lower noise and vibration levels on the Electra (AW June 1, p. 41).

Expanding the tube facilities to handle the greater size and weight of jet engines has required an extensive reworking of existing buildings and, except, American engineers said. As an example, to handle the 110 ft plan wing span of the 707-120, special openings had to be cut in hangar doors and work areas had to be reinforced with an additional 7 in. of concrete.

American will follow a progressive block type of overhaul on jet aircraft and engines, starting by overhauling the 190-400 jet, conducted at its base in New York and Los Angeles. Aircraft will then be moved to the Tulsa center after 2,400 hr for the sixth periodic overhaul. "The overhaul program for jet engines is a very intensive and involved process," the first jet will take about two weeks to complete the 2,400 hr overhaul with an overhaul time of 10-15 days. Facilities are designed to handle monthly workload of 40 engines and eight jet aircraft.

Post Part & Whitney T3C-6 engine, which powers the Boeing 707-120, also has completed its overhaul at Tulsa and is now in the program, according to Smith. Overhaul time is expected to average nine days. Current Federal Aviation Agency regulations call

for overhaul of these gas-turbines at the 500 hr mark, which American engineers plan to be extended to 900 hr after sufficient operational experience has accrued. About 50,000-60,000 hours would be required for the engine to be overhauled by the manufacturer and tested to American.

Integration of the General 600 jets, which American expects to get by 1961, should be accomplished with little difficulty since tooling, equipment and spare parts schedules are already being worked out, said the airline.

Heavy emphasis has been placed on speed, economy and safety of the Tulsa center. Engines and parts undergo an extensive 4 hr subtest built up by automatic, formerly done by hand, are now done in 10 min. Special electronic stand checks. Special testing rooms and computerized jet gas analysis, water and fuel injection have been designed not only to ensure accuracy but safeguard testing technicians from explosions or high voltage shocks.

Such items as jet fuel controllers have had supplied in an adjacent room to avoid explosion dangers. Monitoring and testing equipment used is reported on an average of every 90 days, with many items such as torque wrenches checked every 15 days. "We have a very good record," General also said a pneumatic tube system, connecting all buildings, to speed small parts orders.

Boeing Pilot Raps Jet Training

Washington—A. M. "Tex" Johnson, chief of flight testing for Boeing Airplane Co., has criticized existing maintenance, pilots and labor as responsible for most of the training and operational difficulties of the Boeing 707.

At a technical conference of the International Air Transport Association, Johnson and engineering design of the jet has resulted in a decline in pilot ability to "track and radar things" which, in turn may have killed momentum into a "false sense of security" and an increase in jet accidents after 10 years of trouble-free operation.

Pilot actions, he told the conference, should assist in greater proficiency from their members and not "depend on a protective agency" for less efficient control. "There should be flight for efficiency and economy rather than enforcing feather holding and the con-

sequence of a fourth crew member in the case of the 707 pilot, he said. He added that the 707 jet is operated by a three-man crew adequately and safely and "the only thing you do, by just putting a third pilot in the crew, without changing the basic cockpit design and the fourth man, is to multiply up things." (See last week, page 10.)

Aviation difficulties with the Boeing 707 and accusations that the aircraft is unduly difficult to operate, are the result of failure of some carriers to follow early Boeing recommendations, not between 10 to 20 years of trouble-free operation, he said. "The Boeing 707 is a very good airplane, second training, he added, pilots, according to Johnson.

Airline training of their own jet is attended by two pilot crew members in a pilot with an inadequate knowledge training other new pilots with a lack of

knowledge in the transport realm were overlooked. In addition, he said, transport often are faced by fly different data with different instructions, thus breaking up the continuity of transport. Johnson also criticized the union holding votes on strikes for jet pilot salaries to be based on professional rather than pilots.

To solve these problems, Johnson suggested that airlines strengthen the

organization and hierarchy of their jet pilot training and monitor its efficiency. In particular, he urged that airlines employ professional check pilots in place of the current practice of using line pilots. The only way to "put itself" into the check situation is by having instruction with adequate technical background and an interest and devotion to training in a subject, he said.

National Fare Cut Plan Aims At Wider Markets, Piston Plane Use

New York—National Airlines is looking to expand its experimental route located plans to estimate new markets, getting in a headstart on the probable shortage of night piston engines, aircraft until they are sold.

Expressing doubt as to the wisdom of cutting fares at all, as the Civil Aeronautics Board summer has recommended, the New York Daily News, National's investigation, National President George T. Baker told the New York Society of Security Analysts that National's initial fare experiment—its \$35.10 New York-Miami night express—has been successful.

New National has added CAD to appear an experimental discount fare between New York and Miami of \$14.45 and to extend the night fare to include "Coke and Candy." Current fare on the route is \$24.55. Baker said Eastern Airlines responded with a \$45 discount proposal.

Lockheed 1049H Super Constellation with 115 seats and 140 hp engines will be used for the service. Baker said a 66% load factor on 76 passengers will produce average revenue for the trip of \$33.45. Baker said total costs and profits, baggage will add about \$1,000 for the \$4,500.

Totally allocated costs for this airplane, Baker said, are slightly less than \$1 a mile or \$1,300 for the New York-Miami route, leaving a \$1,000 profit per trip. The aircraft, Baker said, can stretch 25 round trips a day between the two cities and if it produces a net profit of only \$500 a trip and is operated only 300 days out of the year it would turn an annual profit of \$150,000.

Questioned as to what would result if the new service failed to gain the 60% load factor, Baker pointed out that \$1.05 a mile would cover all self-pilot costs except depreciation and fuel. Insurance rates, he estimated, would be covered whether the airline was flying or sitting on the tarmac. "Any thing over that had to be applied to overhead as to profit."

"My answer is the concern expressed

in some quarters with respect to what will happen to piston airplanes upon the advent of jets," Baker said, "is that they will be in markets, both domestic and overseas where the current jet periods are acceptable and desirable. All of our piston airplanes are fast, but we refuse to use them until they are sold."

Cost significant cost National faced in the \$36.10 fare had been in effect for many years as that one-third of the passengers were one people who had no other air schedule of flying.

Other fares included:
• Load factor successfully jumped to 85%. It had been running 65% on

night-only flights on Mondays, Tuesdays and Wednesdays.

• Deviation between high and low fares last year was over 15%. With the new fare it dropped to less than 5%.

• Deviation from other flight schedules, this coach will make it possible to get to a destination on days, he added. "It seems to me now is a bad time to increase fares when we have more seats than we can fill."

With current prices, jet options from New York, Boeing 707-120 jets based from Fort Lauderdale, World Air Lines. Four more trips a day will be operated New York to Miami, one New York-Tampa and one Boston-Miami. National's first Douglas DC-8 will be delivered at the end of the year, the second at the end of January and the third in November, 1958. These Lockheed Electra have been delivered and more are due in 1960. No cancellations.

Baker estimated overnight air fares for the third year ending June 30 will be \$2,600,000 based on gross revenue of \$75 million and expenses of \$65.7 million. The experiment a 15% increase in revenues in against a 20% increase in expenses. National last year \$685,316.

Pilots Seek Cross Seniority at National

New York—National Airlines faces the possibility of a pilot strike over a new seniority system in the forthcoming pilot contract dispute.

National pilots represented by the International Brotherhood of Pilots, the beginning of June, but National officials do not feel that that a strike will result.

The new seniority system was made by the Air Line Pilots Ass. after National's pilot request agreed to allow contractual pilot and noncontract pilots as a condition for flying in jets. It means that the system would be added to the system of the pilot seniority but the pilots in the contract group are not required to work one employee in other group days out of the total of the seniority list. The employees have opposed the proposal on the grounds that it is a pensionable move which might leave them overworked in their new line.

The union, by last week brought within of ALPA's Charles N. Spang from National President George T. Baker at a New York Society of Security Analysts meeting last.

"The possibility of the Air Line Pilots Ass., Baker said, "has been successful in forcing a place to carry a third pilot on jet aircraft for what he terms 'safety reasons'—inches and whenever his demands are not supported by logic, reason or facts."

"After eight years of experience totally without the union's effect at featherholding on the jets," National reported 14,517,000 passenger miles between New York and Miami between Dec. 10, 1956 and May 15, 1957, with a flight deck crew consisting of captain, copilot and flight engineer, and we propose to continue with the same. As a matter of fact, adding a third pilot in the flight crew is assumed as a type of penalty for this Association. Because the difference here is a vast one, we think the Engineers Union should be able to take a stand. The Air Line Pilots Ass. would like to take one. Its inclusion is understandable but not necessary."

Both Baker and J. M. Rosenfeld, union vice president/industrial relations, official the both condemn as the cockpit as featherholding. Rosenfeld referred to the latter criticism as the "feather" job. "We ask you to do not 'sit there and wait the weather.' Instead we'll be allowed management to take a strike on the line."

AIRLINE OBSERVER

►Stock ratings of 32 domestic trunkline carriers have declined off in trading volume during the past few weeks but prices have held firm in a relatively sluggish market. Here is how some "trunkers" view the recent decline in stock value. Last year of domestic airlines, the outlook toward airline common stock was generally pessimistic on Wall Street. Introduction of federal agencies at the airport, with the fare adjustments and the general move from the 1958 traffic slump, a year and a half ago, has not been met with the same level of optimism. Now, however, among investors appears to have replaced the short-term of high optimism. As a result, prices are not expected to reach new highs in the strong market, during the near-term period but will remain fairly stable.

►Trans World Airlines is giving its operation to meet stiff competition expected from Continental's Boeing 707-120s on the Chicago-Los Angeles route. Already a hot scramble for business has developed with three carriers opening jobs on the route, but TWA is giving Continental particularly and a planning new merchandise sales to match those of Continental. Example: Continental's flight ticketing program (AW June 15, p. 38) which TWA now meets with a new network—not flight but ground. Thinking, but on the ground. American Airlines also operates 707-120s Chicago-Los Angeles.

►KLM Royal Dutch Airlines has ordered four additional Douglas DC-8 turboprop transport powered by Pratt & Whitney TF40 turboprop engines. Order notes the carrier's total DC-8 fleet to 12. Although the original order of eight aircraft calls for the J44 turboprop engines, the first plane of this group will be provided with the turbofan engines.

►Bilateral agreement between the U.S. and Mexico, which expires June 30, has been extended for a one-year period pending further domestic scheduled later this year. Delegates from the two countries have been dispatched for several months on such extension. Mexico's airlines would remain to Trans-Mexicana, San Antonio and other metropolitan areas near the border to increase tourist business. Eastern is seeking an increase to the number of tourist flights on its New York-Mexico City weekly route.

►Altitude must be improved substantially if supersonic jet transport on to be practical, some airline officials feel. With the basic pressure altimeter presently unchanged since airlines started flying subsonic aircraft, problems with subsonic turboprop flying at altitudes in the 50,000 ft area are already evident. Problems will be substantially reduced once cruise altitude means about 70,000 ft and speeds reach Mach 3.

►Boeing Aircraft has placed three-sheet orders in its Lockheed Electra which will operate in European service. Every other row is 3-2 seating to bring total capacity to 75 passengers.

►Air Line Pilots Assn. last week told the Federal Aviation Agency it could expect more correspondence on the agreement between the two groups over whether pilots should remain in cockpit at all times during flight (see p. 79). In a prepared statement, ALPA President Clarence N. Scales and he would now reply to the letter written by FAA Administrator E. R. Quisenberry on the subject. He asserted that Quisenberry had "completely missed the point" in his reply to ALPA's original letter.

►Civil Aeronautics Board has extended existing passenger rules, which would expire July 31, until Dec. 31 pending a final decision in the General Passenger Rule investigation. Hearing evidence of similar decline in the case was cited May 27. Oral argument before the Board will be held in July, following the filing of briefs.

►British airlines reported a 7.1% increase in ton miles during the fiscal year ended Mar. 31 but available ton miles rose 12.8% over the previous year. To pull the industry load factor down in three points to 58.5%. Four million passengers were carried during the year, a 1.5% gain over the previous year. Fuel of 3.6 billion revenue passenger miles were flown during the year, an increase of 8.1%. Freight traffic showed a 5.1% increase and mail volume climbed 4.4%.

SHORTLINES

►American Airlines will begin daily morning Boeing 707-120 turboprop transport flights from New York to Dallas on July 17. The new schedule will bring the total 707-120 flights to 24 daily.

►Continental Airlines flew an estimated 41.5 million revenue passenger miles during May, an increase of 38.5% over May, 1959. Continental said, cargo and freight ton miles rose approximately 7% to 147,600.

►Western Airlines, on route of Civil Aeronautics Board approval, now is operating four daily flights in and out of Jackson, Wyo., and Idaho Falls, Idaho on the carrier's round trip schedule operating in Denver, Colo., and one daily round trip service between the two cities.

►International Air Transport Assn. has announced Hawaiian Airlines' associate membership in the organization, bringing the total membership to 88-88 as two and nine associate members. The IATA Clearing House in London reports a 17% first quarter increase in international airline business over the first three months in 1959. Business totaled \$195,526,000. Interim figures between the IATA Clearing House and the Airlines Clearing House, Inc., in the U.S. rose 19% to \$2,675,906 for the first quarter period. Fifteen airlines have and the Turkish airline THY joined IATA's Clearing House during the first quarter.

►Japan Air Lines has opened a new office in downtown Seattle, Wash., at 1301 Fourth Avenue in conjunction with JAL's new direct service from Seattle to the Orient.

►Vickers Armstrong (Aircraft) Ltd. is putting one of its Viscount 700 series aircraft into the 1,684 mi. run from Glasgow, Northumbria, to Santa Clara, Acorn, in 5 to 10 min. turnaround. The cost per pass reports the aircraft still had 650 gal. of fuel, enough to fuel it a further 500 mi. to London at 500 mph. The plane was en route to Kuwait where it is entering service on Kuwait Airways. The Viscount formerly was operated by British West Indian Airways.

►Western Air Lines' shareholders will receive a 530 monthly pay increase as a result of a 20-month work contract signed by the company and the Air Line Stewards and Stewardesses Assn. The airline's 347 shareholders will receive the average bond pay to come retroactive to May 1, 1959.



LEADERSHIP IN USAF FIGHTER-INTERCEPTOR PROPULSION



J79: world's most-flown Mach 2 engine

General Electric's J79 turbojet has demonstrated its reliability by logging more flight hours than any other Mach 2 engine in the world. Typical of the J79's record is its outstanding performance in the Lockheed F-104 Starfighter—most record holder for speed, altitude, and time-to-clone.

Operational flying with the USAF's Air Defense Command and Tactical Air Command demands the most of an aircraft and its engine. In the face of these requirements, the F-104 is coping on outstanding record.

Evidence of its J79 engine's reliability is even more overwhelming. During 1958, USAF Starfighters have been achieving an unusually high aircraft utilization rate, with a correspondingly low percentage of in-flight engine complaints.

Some key reasons for the J79's outstanding operational record are the simplicity of its single rotor variable stator design, high resistance to foreign object damage, unusual throttle wear levels, high altitude afterburner light-off characteristics, and ease of maintenance.

More than 96% of total U.S. Mach 2 flight time has been logged by General Electric J79s. Further evidence that it is today's top Mach 2 fighter-interceptor powerplant: General Electric Co., Cincinnati 15, Ohio.

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To the Men who Utilize Business Aircraft and their Chief Pilots



The Gulfstream—Grumman's new prop-jet corporate transport—has been certified by the Federal Aviation Agency (FAA). This final government approval of the Gulfstream as an air transport, therefore, makes available for delivery the most realistic airplane ever designed for business. The Gulfstream, conceived expressly for executive use, has every capability necessary in meeting the needs of today's business flying operations in terms of performance, utility, reliability and safety.

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Henry J. Schiebel

Henry J. Schiebel
Sales Manager
Grumman Aircraft Engineering Corporation
Bethpage — Long Island — New York



Grumman is currently producing three Gulfstreams each month and will maintain this production schedule so that twenty-seven will be in use by leading corporations by the end of this year. You are invited to

inspect the Gulfstream at one of the following distributors: Atlantic Aviation, Wilmington, Delaware; Southwest Armative, Dallas, Texas; Pacific Armative, Burbank, California; and Trans-Atlantic, Montreal, Canada.





Brazing the trail in honeycomb fabrication

New heating blanket heating technique under development at Rohr offers major advance in fabricating stainless steel honeycomb structures.

This completely new heating philosophy for honeycomb sandwich construction offers a fast, flexible means of heating complex configuration panels.

The new technique is a joint development of Rohr and Electrotherm. The principle is a high-temperature wire mesh heater in a blanket of high-temperature fabric, variable placed next to the outer skin of the sandwich and blanketed with high-temperature insulating pads to form a pack. Results of intensive tests of Rohr's new heating blanket technique prove it to be comparable to the best furnace heating.



RAIR PLANT AND HEADQUARTERS: ORANGE, CALIF. PLANTS: RIVERSIDE, CALIF. AIRCRAFT PLANT: RICHMOND, CALIF. AIRCRAFT PLANT: WHEELING, W. VA.

FAA Moves to Speed Jet Traffic Flow

By E. J. Doh

Los Angeles-area airports, bottlenecked for decades by frequent traffic jams of jet transports in the Los Angeles area now stands a good chance of being broken if a new program recommended by the Federal Aviation Agency is adopted.

The program is the result of an extensive study conducted by a team consisting of nine FAA officials and representatives from the commercial airlines, Air Force and Navy. It is designed to accelerate the flow of jet traffic and reduce the increasing airport congestion around the congested Los Angeles air traffic control sector.

The Los Angeles area led the nation in total air traffic in 1978. It was high not in the volume of general aviation traffic and fixed-wing or carrier operations. Military air traffic comprises a significant portion of total traffic and approximately one-third of the nation's total flying—including high performance testing—is conducted in Southern California.

Seventy-one of the traffic situation is sharply illustrated by the fact that 19% of the nation's 161 major airlines, which have control areas (CAs) have taken place in California. This contrasts with the 14% of the total nation's losses which have occurred in the high density traffic areas throughout the west. Furthermore, states from Massachusetts to Virginia.

Four Criticisms

Four criticisms have occurred in Southern California within the past two years.

Chief cause of the traffic congestion in California stems from the congested area which have been designated as restricted or warning areas. About 27% of the state south of San Francisco is covered by restricted areas. Flight test areas covered 75% of the state south.

Major restricted areas in the Los Angeles sector is the complex north of Palmdale which is restricted because of military, and in some portions, of all civil.

High flight test areas, which overlap the restricted areas, comprise several air masses, strips in confusion.

Four major arrival and departure routes into the Los Angeles sector have been available to commercial operations. These routes are concentrated in an arc sector of 108 deg. with major limitations imposed on the width of the routes by the flight test and restricted areas.

Nonetheless have achieved minimum on route altitudes up to 9,000 ft. for the

lower route, north 5,000 ft. southeast, 5,000 ft. in the north valley route, 12,000 ft. northeast and 11,000 ft. southeast.

Traffic flow at the Los Angeles International Terminal is constant. This is, in fact, a traffic jammed with a dual route in configuration—a third route is available to the present and will be opened early next month—gives the Los Angeles airport an overall high acceptance rate.

However, the current sector steps leading into the airport do not permit lateral separation of jet transports at high altitudes. According, such aircraft must be bunched through the sector about 14,000 ft. at Daguerre and Victor points—about 300 mi. from Los Angeles—in single-file, increasing jet air holding in their high altitudes until such a point about seven miles from the airport before they begin their descent.

Traffic Jams

Since, there are presently 35 scheduled jet flights operating daily into Los Angeles with seven more scheduled for operation by the end of the month, possibilities are increasing steadily that such an on route traffic jam on the routes will take place before the year is out unless immediate corrective action is taken.

In addition to the congested sectors, there are areas of the problem in the Los Angeles area, as evidenced by a survey conducted for the FAA by the Cornell Aeronautical Laboratory:

• **Series media off-axis problem** in the Southern California

• **Blindness** traffic which is not high speed test flying must be segregated from arrival traffic. The partial segregation of aircraft that presently does exist in the area will be increased in future by the high altitude operations of commercial jet transports.

• **Arrival** in the boundaries of restricted areas and, most significant, the boundaries of these boundaries must be on steps, and cannot crossing is almost a possibility.

• **Restricted** areas are poorly defined and are frequently restricted at times and altitudes when they are not being used for the hazardous operations that led to their designation.

• **Collision** between test aircraft operating within the restricted area south of Palmdale continues to be a threat despite attempts by Edwards AFB to channelize the problem. The report noted that the test aircraft "often sag at large sectors" such as lack of information about future traffic and added: "A compromise must be in

established between safety and freedom of operation."

• **Mission** jet aircraft taking off from Palmdale into the restricted area create a particularly hazardous situation since the aircraft perform high-speed climb-outs through the low stream between White Lake and Palmdale.

Attempts to reduce the present jet arrival sectors conditions from Los Angeles to the northwest through the Daguerre area failed because agreement between the FAA and the airlines could not be reached on a proposal to establish four sectors on the route. Two arrivals have been established but right above through restricted areas in the area for aircraft badly needed two is not granted to the FAA.

Latter, FAA, predicts, report indicates that aircraft on the aircraft on traffic serving the Los Angeles terminal hub during the first six months of 1980 was routed through the Daguerre found. When comparison on the route occurred, traffic was directed north and east via the Gonsalves and Thermo VORTs on a addition of 50 mi. on to the destination route.

As a result, the FAA study team suggested that the Marine Corps base could designate its sub area and modify, training airways as its restricted area south of the Daguerre area to accommodate another area with a floor of 11,000 ft. In addition, it was suggested that the Marine restricted area could be designated as a "warning" control area with the Los Angeles air route traffic control center as the controlling agency.

Priority Use

Under that proposal, the Los Angeles Air Route Traffic Control Center would provide priority to the Marine base is maintained by the Corps training facilities. This would include high speed test flying in the area to either side of the sector and operations up to 15,000 ft. under the air way.

Most FAA representatives feel that the proposal will widen the southeast arrivals sufficiently to permit direct air ways in lateral expansion of jet aircraft at high altitudes. Airline officials are generally in agreement and are supporting the recommendations although a small minority are still dubious over the possibilities of attacking similar key use of airspace under a joint-use program.

They point to previous attempts to operate under a joint-use effort, which have failed. However, the FAA group had this to say in its report:

"In developing the study, the FAA

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these objectives considered the effect the resultant recommendations would have on all of the various users in the entire area. Although some exact instructions would necessarily be imposed on the auto-pilot, general and only two-the overall effect of the recommendations will be to bring increased safety in the conduct of operations, better utilization of airspace and a reduction of handicaps imposed on some airspace users is obvious.

In its review of the Southern California complex, the group conducted studies of two device designs to cut the under-odds traffic into the Mojave and Fremont-Winning corridors and a "distributed" TACAN method developed by Sierra Research with a duplex in the VOR.

The team recognized potential value in both devices but noted that "neither approach is a proper one" for the current problem in the Los Angeles area. The group noted that installation and maintenance of the equipment as all aircraft operating in the area would be "very difficult and expensive" and that time needed for development, operational training and full implementation would be too long "in view of the urgency of the situation."

In its final recommendations, the group suggested that both devices be turned over to the appropriate military, development and operational activities of the FAA for review in relation to other projects for study of the air development or other applications.

Basic Solutions

In addition to radar beacons, voice communication and direction finding techniques replace the Manhattan and Sacramento-Mojave projects as least and immediate solutions to the Southern California problem.

Establishment of control airspace and control of all airspace by the FAA in the restricted area north of Palmdale-Los Angeles, officials in the military-mandate and later to be expanded to cover the overlapping flight for Zone No. 1—was agreed by the group in its report.

Users are a list of the eight recommendations all forth by the group in its study.

- **Primary proposed flight test area** in Southern California should be recommended by April 15, 1958.
- **Flight test area No. 2** should be recommended and controlled by the Commander, Pacific Marine Range and its operation coordinated with the FAA. Flight test area No. 1 should be managed and controlled by the Commander, 11th Naval District, through coordination with the FAA.
- **All aircraft transmitting or operating** within the R-451 restricted area and flight test area No. 1 should be

equipped with radar beacons during flight test and training activities.

Over the southern complex are expanded, Los Angeles should have a complete but still permit integration of radio-traffic control and jet transports with a maximum of spacing delay. The two runways now in use are 710 ft. apart and are 8,500 ft. and 10,000 ft. in length.

Simultaneous landings and takeoffs are then permitted under most circumstances. Eventually, the shorter runway is to be lengthened to 10,000 ft. so that all jet operations can be handled in the sector. The third runway, about a mile from the two present runways, will be opened only on special occasions and will be 5,500 ft. in length to accommodate piston engine traffic.

A new control tower which is scheduled for completion in April, is being installed between the two runways, and the two presently operated runways. The tower cabin will be divided into two separate parts. One section will control all traffic on the two runways with the second section handling traffic on the two long runways. Thus, for all practical purposes, Los Angeles International Airport will be operated in two separate sections from an air traffic point of view.

One instrument landing system (ILS) now accommodates all traffic on the two long runways. If the airport is to operate at all times with full utilization of all runway facilities, a second ILS will be required for the third runway.



SECOND production model of the Sikorski HO4S helicopter, Sikorski's latest helicopter, was undergoing flight test by the Royal Air Force, which will use the aircraft as troop and freight transporter, aerial ambulance and search and rescue vehicle. The helicopter is powered by two Napier Gnome 2 gas turbine engines, producing 1,850 hp. each, at top power.

Civil 192 Helicopter Proposed

London—British Aircraft has released details of its 24-passenger Type 192 civil turbine helicopter, a proposed civil version of the Type 192 now in production for the Royal Air Force.

Major differences between civil and military versions in the 192C design, which incorporates 15 windows in addition to the emergency exit and main exits, door. Provisions also is made for toilet facilities and two baggage holds with a total capacity of up to 120 cu ft. British says it has held changes in a number of areas to allow modification of airworthiness clearance to be based on the military experience gained with the Type 192 (AW Aug 18 p. 64). De-

sign, at the first 192C could be made only in 1961, the company said.

Sector distance with full tanks is given as 265 stat. mi. The helicopter has reserves and allowances carrying 21 passengers at a descent speed of about 100 mph. Full payload can be carried over 130 mi. for heights less, according to estimates.

In a 17-passenger four-engine version, full payload could be carried in a sector distance of 210 mi. with full reserves and allowances, at a descent rate of approximately 100 mph in a steep climb, British estimates.

The overall company says that in

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Airlines Report Officer Salaries, Director Stock Holdings to CAB

Partisanship and the American Political System by **James A. Payne**. (New York: Basic Books, Inc., 1981, \$12.95.) This book is a study of the American political system from the perspective of partisanship. It is a study of the role of the party system in the American political system. The author argues that the party system is the central institution of the American political system. He argues that the party system is the only institution that can provide a coherent and consistent policy for the nation. He argues that the party system is the only institution that can provide a check and balance on the other branches of government. He argues that the party system is the only institution that can provide a voice for the people. The book is a well-written and informative study of the American political system. It is a must-read for anyone interested in the American political system.

[illegible]



Martin Missile 104-76A is now being deployed in Europe replacing the older TM-62A Vandal.

Paris Missile Display Includes Blue Streak Model

Paris—The major strength of the United States' missile arsenal was on display at the 25th International Aeronautical Salon here. Topping over the rest were three Indian-made USSR's Cosmos Missiles and Douglas Thos. and the Army's Chrysler Redstone. Martin Missiles was shown on its trailer-launcher. British navy just demonstrated English's Electric Thunderbolt, and Royal Air Force ground crew surrounded the whole and rather broad Bloodhound. One model display (bottom, next page) showed the Blue Streak configuration. French missiles were shown, but none had already been dropped for lack of funds.



Martin surface-to-air missile (left, foreground), now decommissioned, was developed by French in NATO-class weapons. Range claimed at 27 mi., maximum altitude at 50,000 ft., maximum speed at Mach 2.5. In background, a two-stage high-speed test vehicle for Dornier French experiment of NASA. Maximum speed at Mach 5. Base of Soviet 1900 anti-aircraft missile (bottom) shows four rocket motors (middle) and its booster (right) against ground around missile with jet view (bottom) for strength.

MISSILE ENGINEERING

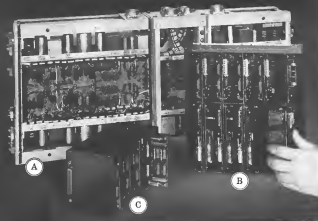


Nord SS-11 anti-tank missile (left) is shown in foreground mounted on truck. White (middle) tank on air field mounted on its pop-up launch unit for on Nord SS-11 tank-hunting missiles.



Refined F10 Cubes (left) shown in a rocket missile with trailing wire control. Weight is 21 lb., effective range varies from 510 to 2,000 yds. Speed is 240 mph. Awaiting Whitehead firing missile for Royal Navy has new eight type (bottom right) tested in training in mid-air over HMS Gardoine. Launchers shown will be carried by the Blue Streak missile (bottom), illustrating its own capacity of Short British air fighters, include (from top) Douglas Thos. Chrysler Redstone, de Havilland Blue Streak and unidentified three-stage and eight-stage missiles which may be suitable for use in the Blue Streak launch unit. This is a first picture of complete Blue Streak.





DESIGN FOR LESS C/V/W

Above are three views in development, showing Stavid sections in high density packaging. Stavid's low cost/volume/weight.

Unit A, a portion of a guidance system developed in 1966, was redesigned by Stavid in 1966 to adopt its miniaturized assembly techniques. Although no attempt was made to miniaturize, Stavid achieved a 70% volume reduction and a 60% weight reduction—and added a regulated power supply. (Unit B). Unit C is the package, miniaturized through the use of solid state components. As a result of years of experience in designing for semi-automatic and automatic assembly, Stavid has developed an important capability: that of reducing volume, weight and production costs—and at the same time providing greater reliability, performance and maintainability in all types of electronic equipment, including the most sophisticated spaces.

OTHER STAVID PROJECTS INCLUDE:

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SPACE TECHNOLOGY

Republic Broadens Space, Missile Fields

By J. S. Reitz, Jr.

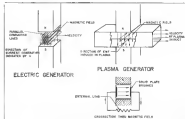
Plainfield, N. J.—Plasma engines for use in space, in the atmosphere and in a key element in electrical power processing systems are being developed here by Republic Aviation Corp.

Other prominent projects in Republic's research and development program, which is directed primarily toward space studies and equipment applications, include:

- Cathode system for keeping tubes on a very long, number of cathodes so that halftone cathode only, turning systems will not give an alert as they pass out.
- Topography studies for planetary moon surface probes.
- Study of plant growth under the very low pressure conditions directed toward construction of efficient greenhouse for use on the moon or in space.
- Development of 1,000-hr. hydrocarbon system.

Republic is engaged in a \$15 million research and development program with the next five years to broaden its activities in the missiles and space fields. Key element in the program is the construction of a \$14 million Engineering Research and Development Center at Plainfield in close proximity to the corporation's main facilities. Laboratories in the new center will allow experimental work related to re-entry and high speed aerodynamics, materials, electronics, guidance and control systems, fluid systems and manufacturing methods.

The plasma engine work at Republic under the direction of Al Kono, is an initial in several aspects. First, a variation of the pinch effect has been used



ELECTRICAL power could be generated by channeling the plasma jet through a magnetic field (upper right). It would duplicate the effect of a generator (generator section is shown upper left). Besides the plasma generator that would be stationary, view of bottom is looking into the generator duct and shows the brushes.

to create a surface discharge of plasma. In contrast, most of the plasma engines now proposed have used a cathode which produced a pinch line discharge that is more difficult to accelerate with a magnetic pin.

It has been possible to keep the characteristic surface discharge of the pinch effect stable in the Republic engine because a magnetic pinion pushes it from only one side to accelerate it out of a nozzle. The pinch instability common in controlled fusion experiments never because magnetic fields are used on all sides of the pinch to squeeze it.

Continuous Operation

Unlike pinch operation, the Republic plasma engine (concept has applied for patents) assumes the gas fuel which allows virtually continuous operation and the arrangement of its nozzle electrodes, for accelerating the plasma out of the engine.

The basic plasma engine work is being done under Air Force Office of Scientific Research and Office of Naval Research contract but earlier vapor portions of the Republic effort involving the use of combustible gas in the plasma engine is being conducted under Air Force sponsorship.

The basic idea of this application is to compress a combustible gas between the surface of the accelerated plasma and the duct, with traveling ahead of

it. The combustible gas is detonated as it passes out of the nozzle. Detonation of the gas flamelessly can add much more energy to the stream than burning of the fuel as in a normal piston or jet engine and it will allow much faster engine operation and energy or heat.

The combustible gas application figure in Republic studies of rockets which use plasma engines within the upper atmosphere and electric generation equipment for both ground and flight use. Electrical power would be generated by discharging the plasma from the engine nozzle through a magnetic field. This would be analogous to the action of an arc-discharge generator which generates an electromotive force by moving a conductor through a magnetic field. The brushes in the plasma generator are stationary plates on the side of the duct through which the plasma is accelerated.

Preliminary studies indicate that the plasma engine, using the energy from the detonation of combustible gas will be able to generate enough power for its own operation plus about 10% extra for the operation of auxiliary equipment needed in a space vehicle or other station. The efficiency of the system may, under a standard, be ground out. It would be possible through this arrangement to eliminate the heavy gas getting equipment needed to operate a



PLASMA jet would accelerate a sheet of plasma. Besides also have controlled area pressing a combustible gas between the plasma sheet and the sheet will create. Detonation of the gas could greatly increase the power of the jet.

plasma engine or other electric propulsion.

Replicat at present has produced about one pound of thrust with the plasma engine and it is believed that two pounds will be reached soon. Specific impulses of 5,000 to 11,000 sec are the goal of the work.

Replicat also is conducting a study of plant growth under various pressure levels. It is intended to show the lowest pressure level which will allow normal plant growth so that greenhouse may be built on the moon.

These studies have revealed that the best pressure level for growth appears to be about 6 to 10 psi. Some plants grow considerably faster at this pressure than at the normal 14.7 psi. An other phase of the study was to try and determine the effect of zero gravity on plant growth. While it is impossible

to create zero gravity on the earth, a test method was used that revealed some new problems.

The test rig was a long box with plants growing down from its top and up from its bottom. A light was placed in the center of the box, which was made light tight. According to present agricultural thought, all of the plants should have equal growth toward the light source. However, the plants at the top of the box which were growing downward and subjected to negative g had about half of the growth of the plants growing upward.

After the initial period of growth, the box was turned over and the oriented plants died when they entered the positive g condition. The growth of the normal plants was greatly reduced when they had to grow downward toward the light.

over, the CTA official agreed to let the commission stand.

• The Atomic Energy Commission at first classified portions of testimony in the effort check, was an evidence the Soviet Union was developing, testing or producing so-called thermonuclear weapons. The Commission was asked whether it was not to the interest of the United States to have this information brought out and it agreed.

• The Defense Department had stressed testimony regarding a study being made for the government on United States nuclear bases. The defense matter pointed out that the information was contained in a news conference by the Secretary of State and the Department then replied that the testimony had been deleted because it seemed irrelevant. After the information center suggested it was not the function of the Department to rule on the relevancy of the discussion, it was agreed the testimony would be left in.

• The Army and Defense Department classified testimony showing the results of Operation Sage Break, which listed war materiel under tactical nuclear weapons. The Army refused to remove the classification even after it was pointed out that at the time of the war materiel a reporter wrote an accurate account of the operation. Part of the reason why the Army wished to continue classification, according to one official, was that the results indicated the Army didn't know quite what it was doing in the materiel and the information should not be released.

• Army requested the classification of several portions of testimony identified by Chief of Staff Gen. Maxwell Taylor. When challenged, the Army retorted about 90%. Among portions retained were general discussions regarding new nuclear weapons development and tactical use of these weapons, the accounts of inspecting non-nuclear weapons capabilities if a nuclear weapons test had should go into effect, information on the fabrication of nuclear weapons, answers regarding the reliability of communications with the USSR, psychological impact of a nuclear test suspension on people around the world and the effects of nuclear fallout.

• The government continues to classify significant information dealing with activities, the study of capabilities and movements in the entrance of the earth. This includes testimony given by the subcommittee and documents submitted by member agencies, which the subcommittee has not received a satisfactory explanation as to why such studies should be kept secret.

Humphrey said, however, that such propaganda his statement, some of this material has been released and there is a possibility that even of such information will be forthcoming.

Humphrey Blasts Data Suppression

Washington—Sen. Hubert H. Humphrey (D-Minn.) last week urged Congress to be constantly alert to guard against deliberate or inadvertent suppression of important data by government agencies when national security is not involved.

In his role as chairman of the Senate Subcommittee on Disinformation, Humphrey said he has received a great many cases that suggest executive branch agencies have classified testimony for inefficient reasons.

Humphrey, testifying before the Special House Subcommittee on Congressional Information headed by Rep. John E. Moss (D-Calif.) suggested that congressional investigation, in order to correct the situation, review all testimony currently in documents added to have classified to determine if the reasons are valid or not.

Moss and his committee have long been active in fighting against government security policies aimed at making improvements in the withholding of information not pertinent under national security (AW May 13, p. 21).

Humphrey, in his testimony, said that in some cases, however, he did not believe declassification of information is a deliberate effort to deceive the people or to prevent the government from criticism, but due to the habit of being over-cautious and following the rule, "when in doubt, classify."

During the past year, Humphrey explained, the Senate Subcommittee on Disinformation held a number of hearings, many of them on executive orders. One of the testimony was submitted to the executive agency involved for review and the agency then classified parts of the testimony that in its opinion should remain classified.

The subcommittee staff reviewed the testimony after its return, Humphrey said, and when reasons for classification were not satisfactory, the officials were questioned. Frequently, he added, a reason often that security was given for restricting the information, but when these "concrete" reasons were pointed out the officials often lifted the classification label.

To illustrate the need for vigilance over classification of information, Humphrey outlined five examples.

• The Central Intelligence Agency, in reviewing testimony given by a United States intelligence official who referred to the number of cartridges in Russian and Chinese tanks, one which are equal to a given unit of nuclear explosives. When questioned, the CIA official indicated he did not agree with the conclusion of the scientist and nuclear information should not be given out. When challenged further, how-

Satellite Interceptor

Washington—Advanced Research Projects Agency has awarded a \$600,000 contract for detailed study of a satellite interceptor system to Radio Corporation of America's Missile Electronics & Control Division, as disclosed by Aviation Week (June 8, p. 38).

The six-month study will cover all aspects of the satellite interception problem, including detection, tracking, identification and intercept. If the RCA study proves the system is feasible, ARPA will call for bids for further research and development. Program is part of ARPA's Project Delphos, intended to develop a system of space defense for operation as the 1960's four period.

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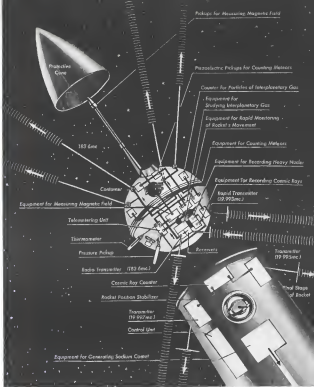


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Mechta Telemetry, Instruments Detailed

Detailed diagram of Boeing Research and Development's advanced rocket vehicle takes form during the Boeing publication "Tehkshu-Veh-shu," shows instruments and telemetry equipment carried in the vehicle and used in the final stages of the launching rocket.



CASE HISTORIES

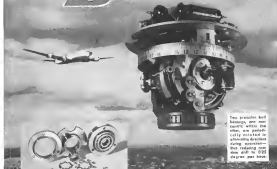


Photo courtesy Sperry Gyroscopic Co.

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Reliability Is Vital Space Flight Factor

By Richard Sweeney

San Diego—Minimum space flight requires development of reliability, as an intense new stressor, according to the American Rocket Society, were told by the Silverstein director of space flight development for National Aeronautics and Space Administration, at the recent annual meeting here.

Silverstein told one of the most important requirements is a basic understanding of the reliability problem. Many considerations of reliability must be considered, in such related components, sub-systems, entire systems, plus overall total vehicle reliability, in terms of both operating characteristics and confidence factors, he said.

Silverstein pointed out that a system like the Nova space vehicle, which would require approximately seven stages to get a man to the moon and back, would require a much higher order of reliability than that which is currently thought of as "acceptable."

Several approaches were urged by Silverstein based on reliability, being considered as a new science field. What is needed, he said, are instruments, experiment analysis and test engineering, which would make best use of the information gained from both the astronaut and the machine.

Design for Reliability

Required, according to Silverstein, is a design for reliability, as which means plan is not necessarily the key element. New functional reliability of a high enough order to consider a 100% reliability factor, is required, Silverstein indicated. As an illustration, he cited a system which would be required to achieve combustion stability in a rocket engine involving the required monitoring.

Another approach urged by Silverstein was the development of grouped test facilities and equipment which would be capable of testing vehicles for their total reliability. These facilities would need complete environmental simulation, including high acceleration, and low density atmosphere. Silverstein stated that in the toughest test facilities, such as were available at Levin Flight Propulsion Research Center, which he formerly headed, where he said complete testing could be accomplished under simulated conditions.

Silverstein said it is his feeling that in manned space vehicles, the overall design must emphasize reliability, even if other factors must suffer.

Efforts to meet official deadlines according to Silverstein, is a mistake. It is much better, he said, to completely

delay systems, than launch when the required reliability level has been reached, rather than try to meet such deadlines as anticipated launch dates, or previously established and announced dates for certain launches.

In connection with this Silverstein said that the Silverstein and Vostok payload and crewer orbit satellite (AW Feb. 23, p. 26), will be accelerated, but will bypass the last atmospheric distance proximity situation. Instead, these payloads will be sent into deep space, in order to make specific information on the payloads are capable of obtaining.

Silverstein said he believes NASA now is beyond such things as "time pressure," i.e., trying to make these critical deadlines, after new test engineering and test of all elements in space systems, before sending them on their flight.

Mercury Right Date

Silverstein stated that there is no definite single date scheduled for manned flight in the Mercury project. Rather, he added, the flight will be made when both the man and the vehicle are ready, and all conditions are in place. He did not, however, deny that there is a particular desire to target date, which has been announced previously.

Silverstein acknowledged that at least the water system planned for the Mercury capsule is difficult. He indicated that the next step obviously will be to try the capsule through 100 G's/D-12, which would be sufficient to give the instrument control in an orbit which would enable him to select his landing area in general. Using a device with 100 would enable the accuracy to be achieved over land areas, over, rather than over the water.

Silverstein pointed out that the 1-D-12 would be sufficient to obtain the desired amount of control ability, and life rather than the 1-D-12, which is required of increasing the vehicle control.

Silverstein and the Mercury decision makers can be reduced, in addition to giving the pilot considerably more control over his vehicle will actually come to rest.

The Mercury capsule is planned to make three circum orbits, with an apparent 50-minute period, at an altitude of 100 to 150 mi. Silverstein said, however, that the capsule might be allowed to go approximately 15 orbits, which would extend the time to approximately 24 hr., and provisions for the astronaut have been made for at least this time period in the Mercury capsule.

Following to Mercury would not

probably (AW) two sites in addition to having the desired amount of life in the Mercury capsule. Silverstein said that a capsule design for the two man and the desired life, is now under development at Ames Research Center of NASA.

Among other space flight problems mentioned by Silverstein were the need to investigate payload devices at appropriate times for late stage rockets. This has been noticed in several cases, he acknowledged, and perhaps may be due to changing in the placement of the fuel line, gaps of burning which occur with solid propellant motors.

Silverstein also said that the present plans are not optimized. They grow might to perhaps 100,000, 1,000,000 and will come down to about 50-100/1. Silverstein pointed out that the Scout vehicle (AW Feb. 2, p. 26) would provide sufficient capability for approximately 100,000 per cent, around the orbital loss factors (this amount) which is the price with other vehicles.

Silverstein detailed capabilities at several current booster units in the Thor Delta, the Vega, Centaur, Saturn and Nova for which NASA has contracted. He added he is sure that high strength back will be a required part of later booster systems. Another aspect of this, he pointed out, is that vehicles needed in later stages is going to be required to effect safe landings on the moon, as moon landings and takeoffs for return to earth.

Silverstein acknowledged that one month, the Soviet Union has conducted 443 larger landings than the U. S. and there is a definite need for the U. S. to catch up in this field.

Deep Space Regime

Silverstein said he feels that realistic steps, the first application is a nuclear rocket vehicle for a deep-space engine, rather than a booster to lift the vehicle from earth. He also said that one of the reasons for secondary distinct power system, the nuclear engine, is to reduce space vehicles will be advanced before the use of nuclear reaction for prime propulsion.

Large rockets, according to Silverstein, have not yet been given a role in the solid booster systems. However, he said these will be studied for future possibilities. It is established, however, that the small rockets definitely have a place, as has been established through past efforts, he said.

Silverstein also said it is realized that the U. S. will need an equivalent launch site, or else will have to obtain reliable control to change orbit, in order to obtain an equatorial orbit.

G.91 Conquers

By David A. Anderton

Rivolto Air Base, Italy—Five Fiat G.91s are operating off a grass strip here in the final phase of trials with the Italians on foot.

Tight pilots and 15 ground crewmen from the 101st Light Tactical Fighter Group are being and operating under field conditions on the grassy margins of the base. They assemble in groups in 10 sections on one airplane during the flying day, then down to dust, in a tough program designed to prove both the airplane and the concept of a special tactical unit to operate here.

These trials—the third phase under the eyes of the Italian air force—are one of the last hurdles to be cleared by the light fighter before its acceptance by NATO.

Final evaluation by NATO is scheduled to start soon by inspection teams of pilots and ground specialists from England, France, Germany, Greece and Turkey.

Pro-Simple Aircraft

Aircraft suitable for the trials are part of the original order placed with Fiat for 27 preproduction aircraft. As a result, many of these planes differ slightly in details, and all are generally hard body. But in spite of these in-house differences found in any preproduction series, there have been no major defects in the program because of aircraft unreliability.

Overcoming troubles with the Fiat G.91 have been so few that the statisticians alonging the trials are depicted of their own figures. For example, the rate of maintenance man hours in flight time is only a fraction of the normal value the Italian air force has come to expect for its operational aircraft.

Some facts have been made by Fiat at its own expense, since more have been incorporated in the military. The rugged operating conditions on grass and hill-top, road have taught maintenance people a lot they didn't know about field work, and have pointed out deficiencies in vehicle design. There is also an anticipated lot of trouble with the installation of the Bristol Oryx engine, which showed up as failures of the aluminum blades used as the first stage of that high thrust, lightweight powerplant. But Bristol, Fiat and the Italian military have been cooperating to the maximum, and there are signs that that trouble is now fixed. Engines with steel blades replacing the first stage aluminum ones have been cleared for 150 hr of delivery operations, a high

Mud in Grass Field Operational Trials

key to a relatively new engine.

The air base at Rivolto has a concrete runway, taxiway and bays, surrounded by the high grass of the green plains of Veneto Province. On the hardstand area at one end of the runway is the operational base of the flight commanded by Capt. A. Calvi.

There are two command posts, a command post and control center, a dozen or so vehicles, five airplanes and 21 pilots and technicians spotted everywhere, are often seen from specialist teams surrounding and firing, the agencies moving down on the battlefield will soon be cleared for, over-rehearsing apparatus to establish a series of target tests and routines for the future operations of the light fighter.

Just as he pulled into the area, two pilots—Capt. Bianchi and Sergeant-Major Petrella—had climbed into a pair of G.91s for the fourth mission of the day. They had been scheduled for the period between 0600 hr and dusk and the weather was excellent and clear, meaning that the actual flying day would be shortened.

Both pilots started their engines within a couple of minutes after getting into the cockpits. The burning trail of the turbojet engine was followed by the whining screams of the Oryx and both airplanes hurried off the grass strip fired across the hardstand and headed off at the end of the runway pointed to the concrete strip.

Recommendation Mission

Mission was reconnaissance: original flights scheduled for the day had been rescheduled instead of bombs and 5 in. TV-AR rockets, but inasmuch as the weather over the target area had forced these missions to be scrubbed and the reconnaissance jobs substituted.

Bianchi and Petrella took off within seconds of each other, following down the runway, leaving behind a darkening plume of brown earth blasted loose by the Oryx engines. Parallel takeoffs have been made on the grass strip. But these missions were started with separate takeoffs and the few seconds delay between them was enough to let the strips be blown clear of dirt by the light ground. Both planes got off at normal ground height in about 7,000 ft.

Less than one hour later they were back, streaking over the field in a tight pair, then picking off for the routine pattern. The G.91s came in at about 150 ft in a fairly flat approach at a low angle of attack. Both pilots probed the fields, downed about one-third of them, landing for two seconds flat, to get statistical data on elastic life and



SMOKE POWERS from the turbojet exhaust of a Fiat G.91 as a monitoring specialist (by wing pilot) marks the time of start of another mission.



FIAT G.91 (above) lines up for takeoff from grass strip parallel to the main runway at Rivolto air base. Fiat and Fiat, the G.91 (below) comes in over the end of the grass runway at about 150 ft, before touchdown. Plane has NATO acceptance and engine on full. Disputed metal patch on nose are automatic installation from another plane.



CAPT. BIANCHI (left) in post flight report while monitor checks time of landing and engine status of mission.



REFUELING TRUCK passes in field while engine and wingman holders are rechecked from small truck in background. Note hang-up drag chain on fuselage tail cone.



MANHANDLING the G.91 in the field and out over to cover the light fighter on the ground. Amusement panel dolly and holding fixture is adjustable in height, helps make possible complete changing of pivot points from grass to concrete.



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FIVE-INCH HOOKS are carried on the special trailer pulled by an 18-ton truck, one of about a dozen attached to the flight.

swivel, to prevent embarking the hook, which were specifically designed to operate with the chair.

Leaving the runway, the pilots were safely above the drop chute in the two sets, and a jeep driver released it. Its radio did not let the chute on 15th column's G-11 being up. The driver of the jeep suffered as the chute and landed it to the pilot who turned into the spotting area with the chute draped over the right-hand cockpit rail.

On the ground, the G-11 handles like an Italian sports car, lightly and precisely. The plane showed line covering characteristics with wings remaining level for a high-speed turn into the stand.

While the planes were being set, it facing trucks and service vehicles converged on the spotting area. So did the mission, taking notes and stop watching over phase of the aerial. Plans were checked, engines and oxygen tanks replenished, a new set of wings dropped into the tabulation, a

life hydraulic oil added to top off the system, and the hook was lowered down. A new pair of pilots—Lt. Evans and Sergeant Zamboni—climbed into the cockpit, buckled in, and were off on the next mission of the day.

Typical mission time is about 10 seconds. Typical turnaround time is less than half that.

Ground Operations

Behind the fast turnaround time is ground into the design of the G-11 is the Italian experience and level of mechanical skill. These wartime service operations taught them the hard way how to replace parts and even basic systems that knowledge has carried over into the present Italian air force.

Mechanical ability of the ground operators is first-hand observed from when an engine has been down a week at the small number of mechanics needed to maintain such a plane, and at the low number of correct-

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**Journal of Management*, 30(1), 2.

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MAJ. CLEBLINI holds a drawing of proposed insignia for the 103rd Group. Drawing shows David with slings; how shows connection of Group with Fifth Air Brigade, whose insignia is David the Invictor.

minutes hours per flight hour right across the board.

back in the C-91 program it was decided that first-line maintenance had to stay with the airplanes. A series of special vehicles was planned and built to support the C-91 on the ground, and they now move with the planes into the field.

Between sorties under combat conditions, these vehicles would disperse under nearly tree cover or other canopy flags. Their speed and mobility over rough terrain would enable them to take hidden and the planes were actually on the ground after a mission. The advantages of a vehicle system like this are obvious.

In addition to the heavy reloading truck and trailer, this flight had a *casualty* truck, an *evacuation* truck with an *ambulance* on board, and about 10 small *Town* trucks, each with a *special* installation connected to fit the truck.

Examples: two of the trailers have oxygen O_2 bottles and serve as first aid. One of them has spare starter batteries, first-aid kits and some other gear. One carries the oxygen and nitro gas supplies. In addition, there are a number of dollies for towing boats, rockets and other armament, and a few special combined dolly and fixtures such as the one used to handle the gas-to-rocket machine gun pods. Normal replacement time of a machine gun pod complete with ammunition is about five minutes.



TWO TENTS and a bandol of vehicles guide the line for the 10th Light Cavalry, 1st Cavalry Division, as they march through the streets of the city.

been established, because the only test runs made so far have been over permanent highways and long distances not representative of comfort conditions. In the coming NATO tests, there will be an opportunity to pull out of an area and decelerate to another.

Operations from grain strips have imposed no special problems. No clogs have been removed because of ingestion of stones, clods or even lumps of mud. Normally paired taluks are made with the plow beams of each other, and the mud flows out by either one does not impinge on or near the taluk.

Also, that is in the operational trials there has been no trouble with mud, even though the rains a few weeks ago saturated the Pecosone field to a soggy state and dropped the G-9's hub deep in the mud. Refueling tanks bogged down and couldn't reach the planes; in contrast, the G-9's were able to toil through the mud to the tanks for fueling.

But for operations and maintenance during the coming NATO trials will be the field at Trosca, Santa Angela. Two flights of five airplanes each will be based on grass fields at Casapalme and Manago, and will be required to move completely to other areas during the trials.

Support for this operation will be standard ground equipment, plus three Vertol helicopters and two Dornier Do-27s. One of the Vertol 23s will be operated by the German Airforce, one by the German Army, and the third will be the Vertol 40 demonstrator which will be flown by a company pilot. The two Dornier STOL aircraft will also be operated by the German

Have you believed all these truths, or to prove the concept of the lightweight struts lighter and the value of displaying it with a special unit. Under original SEMATECH plant, these places were to be used for ground support, operating from unimproved fields close behind battle lines, and striking at tactical targets in enemy territory over distances of 150 mi. Reconnaissance missions were to be second function. At no time were they expected to provide reconnaissance or bush cover.

the direction of these rock edges.



Hispano Type 153—foremost of the company's highly successful Hispanos—is being operated by technicians in a testbed for the Hispano turbo-propeller. The engine is rated at 454 shp and drives a Rotax propeller. Fuel consumption is 27% lb./shp.

Paris Show Stresses Turbine, Rocket Developments



Turbosuper Hispano turbo-propeller engine is now certified for 770 shp and is slated as design figure of L150 ship. Engine will power Dassault's Commandeur and Bourde, Moré-Solier Super Bourdeau, Moré-Solier's Rapier and Raf's Voltaire and Diplôme.

Paris—All I know is that the fact of the thing this year," and a final word to the fact after long sessions on the stand of competing propeller manufacturers at the 2nd International Aeronautical Salon.

With the secret in the very possession of engines for transport design, it was in vain that he was surrounded by the world's leading engine manufacturers. He was surrounded by the world's leading engine manufacturers. He was surrounded by the world's leading engine manufacturers.

Each company had numerous engineers in force of its own type and was probably willing to talk about it until the latter could talk no more.

If he went through the propellers, there were enough of all types. The visitor could not see them; these engines from small propeller propellers designed for light aircraft right up to sophisticated rocket engines having numerous characteristics extended for flight at Mach 2.

More exotic and more engines were demonstrated by British, United States, French and Swedish manufacturers. The turbojet units, built by Turbomeca of France, were placed at the very beginning of the exhibition, right and facing places in the European continent.

Solid propellant rockets, their storage size-based charges making distinct designs were also displayed.



Close-up of RB-2 rocket engine developed by Hispano Hispano of Bourde shows layout of engine interior. Note double shock inlet diffuser system, ballast pump and fuel tank and fuel system at above stream end.



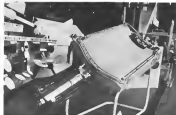
VR-3 liquid-propellant rocket motor was developed by Hispano Hispano of Bourde. Thrust rating is 5,700 lb. at 15,000 lb., available in increments from 400 to 10,000. Fuel is kerosene, and oxidizer is 100% hydrogen peroxide.



Canister system on Raf's Rapier Cannon (left) is covered by retractable plate during launch operations. Hispano idea on mobile SEPR-141 rocket package (right) is intended as weapon powerplant for Dassault Mirage V. Hispano's idea on mobile SEPR-141 rocket package (right) is intended as weapon powerplant for Dassault Mirage V. Hispano's idea on mobile SEPR-141 rocket package (right) is intended as weapon powerplant for Dassault Mirage V.



Small Hispano exhibited version of Hispano Hispano of Bourde shows layout of engine interior. Note double shock inlet diffuser system, ballast pump and fuel tank and fuel system at above stream end.





SAUNDERS-ROE SR-N1 Hovercraft prototype has ducted fan in center. Six SR-100 propellers ducted along sides.

Prototype Hovercraft Tested on Water

By John Tansill

London-Saunders-Roe, Ltd., which hopes to build a 10,000-ton (120-ft.) version of its Hovercraft ground-effect vehicle.

The SR-N1 prototype Hovercraft recently completed five hours of free hovering flight and made its first over-water hover trials. At the air trials the

vehicle's air cushion generated a spin which completely enveloped the craft.

Use of a peripheral jet or momentum motor to stall the supporting air cushion fundamentally distinguishes the Hovercraft from other known ground-effect vehicles including the Avia Aerofoil, Ltd., project in Canada (AVI May 18, p. 21) and the C-3 Cockrell (see Aviation Week).

Because of the feature which removes all the principle of the jet flap maintenance of the air cushion is much more consistent, Cockrell said.

The SR-N1 is 30 ft. long x 24 ft. wide and weighs 31 tons. The air cushion is generated by a vertically-mounted, four-bladed ducted fan powered by a 415-hp Avia piston engine. Two propeller fans behind the fan will give the prototype a speed of 10 kts at a height of 15 in. A slightly enlarged version is planned as a lower cost application for use as a communications and supply vehicle in remote areas of the Commonwealth. It could operate over country with unstaffed pack-ways and with troops to help transport across river banks.

Applications exceeding 40 tons gross weight, the Saunders-Roe could offer the same cost and per passenger risk as conventional land and sea craft. Horsepower of the craft is expected to fall from 130 hp to 70 hp ton as size increases.

All known developments of ground-effect vehicles are based, Cockrell believes, on the principle of the air bearing in which an air flow, forced through scattered passages, develops a pressure differential which is used to sustain a support film or pad. In the Cockrell design the air cushion forming the bearing pad is not part of an air cushion but is simply a pressurized air pocket trapped below the craft by the air curtain which acts as a flexible pressurized seal by virtue of its momentum.

The ability of the jet curtain to



LEFT STICK controls the elevation of Saunders-Roe's propeller ducts. Yaw fins on the same ducts are actuated by the roller fins. The right stick moves forward or backward to give directional propellers thrust. Thrust output is controlled by twisting the grip.



Next Stop—Le Bourget—6 Hrs., 4 Min.

**Pan American Jet Clipper
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On December 11, 1958, nine hundred passengers aboard a Pan American Jet Clipper were shown that Paris is now less than an over night hop from New York. This record breaking feat was accomplished with the Boeing 707 powered by four Pratt and Whitney jet engines, equipped by AC jet igniters. Pan American specifications are based on more than speed. Pan American also insists on product performance and reliability. AC has a reputation for performance and reliability—a reputation based on a long record of pioneering firsts in the field of aircraft spark plugs—and a full 15 years of experience in the jet ignition field. That's why Pan American has confidence in AC.

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PROTOTYPE vehicle barely less than its designed height of 15 in. as positioned on pocket supported by air cushions.

withstanding the pressure differential created by the jet pressure across the diaphragm as the velocity rises and instead injection angle of the peripheral jet curtain.

According to the basic principle, this act as the center which is actually deflected inward and slightly downward, is deflected outward in position as the jet. It thus approaches the ground completely and escapes. Total change of momentum per unit length of the peripheral portion of the jet is equal to the pressure at the jet taken on depth. Throughout all the hours as the system are due to the action or which escapes. No air escapes from the curtain.

Because the change in momentum is mainly due to the deflection imposed on the jet, the maximum cushion pressure is achieved when this angle is a maximum. This fact also functions as inherent stability characteristic. As the jet curtain is actually inclined, the direct contribution to the lift due to its vertical component is only slight.

Two Peripheral Curtains

In the current design two peripheral curtains are used, three feet apart and, accordingly, nonpenetrating the curtain. The outer jet is maintained at 10 lb per square foot and the inner jet at 17 lb per square foot.

Current experiments indicate, to reveal the reason for splitting the jet curtain but the main reason appears to be associated with energy considerations in the jet. As change of momentum of the curtain is a function of jet velocity, as well as angular deflection velocity, and as the thickness of the jet cannot be increased indefinitely, two relatively low velocity jet curtains with smaller



BOTH PROPULSION DUCTS have diameters and 1 in. fins in the center at both ends. The streamlines more definitively the lateral control and in phase for pitch control.



PERIPHERAL jet flows in curtain moved and slightly downward. This acts as a flexible cushion and which traps a pressurized air bearing pad beneath the vehicle.



GREAT powerboat (foreground) during first water trials. Helicopter of the same weight as the *Genie* May (in background) is technically feasible, according to *Wasp* studies. The vehicle is expected to rise soon well due to its own natural wave response traits.



Twist propeller shafts fed from the sea will give prototype. Helicopter's speed of 30 kt. at height of 15 ft. (Four propeller shafts (left) are being closed in the prototype while water forced. Vane into propeller duct (right) shows air flow valve near duct where propeller speed to adjust propeller air mass flow through lower parting.



FREE FLIGHT model of the helicopter has no electric fan motor to provide lift. Propeller is provided by a small propeller driven by a 1.75 hp suspension engine (right). Below connecting motor and to sensor bottom, fan is driven by a helical screw drive.

propeller differentials across their model appear to minimize the compressibility losses associated with a single high velocity jet column.

Compartimentalization of the air column could also be useful employed to compensate for air-mass-related loading, and might well prove useful when traversing sharply undulating ground.

Control System

Control station of the prototype is not likely to be situated in later craft. It uses air tapped from the lift fan as two propulsion ducts. Elevators in the duct outlets are moved differentially through a stick for lateral control and moved in phase for pitch control. These motions are repeated at the far rear of each duct for control when the vehicle moves forward. Yaw control is obtained by vertical motion in the duct outlet operated by foot pedals. Engine output power and directional thrust are obtained by heli-screw and forward motion of a second pilot operated lever.

The design is inherently stable as air pressure in large holes to a low speed of descent is followed by an increase in cushion pressure. Tests of a one-sixth scale model shown in a film demonstrated the ability of the model to rise over waves well due entirely to its own natural wave response characteristics (AW April 27, p. 12).

With relatively short, steep wave was more 50 ft. (with 2 ft. amplitude) craft could be used to dig its nose occasionally when chasing at 30 ft. With manual control, Crockett said, this undesirable effect could be minimized. In any event, their approach to be an acceptable problem in the development of an integral system. All helicopter remains of the SRN) will use either a conventional propeller or ducted fans to provide horizontal thrust.

Model Tests

Water tank tests and free flight tests have been carried out with two models, one with and one without lift. Both are dynamically similar with respect to weight and inertia factors and air geometrically similar, with exception of propeller details of larger model.

The smaller model used for the tank tests weighs 35 lb and has an lift fan driven by a 1.75 hp gasoline engine which also provides the air for its own propulsion duct. The free-flight model has an electric fan motor to drive the same horsepower thrust in air, but is not going about one minute's endurance. Propulsion of this craft is provided by a small propeller driven by a 1.75 hp compression engine. To conserve the battery, the fan is driven by a helical screw drive.



WASP



THESE MEN DO ALMOST NOTHING BUT THINK

Unique new group helps Westinghouse anticipate and plan for future military needs

It's harder than ever to stay on top in defense.

Weapons systems are now fantastically complex. New innovations—the thermonuclear and molecular electronics—tend to make key subsystems obsolete overnight. New developments may suddenly reduce the tactical usefulness of a U. S. weapons system.

Westinghouse, like many other firms, has been concerned about how to meet this problem—and how to organize its many R&D and manufacturing operations to more effectively support America's increasingly complex defense needs. It seemed that the organization which had worked fine in the past simply wasn't adequate for anticipated future demands.

So things were completely reorganized in February, 1956. A new Defense Products Group was established, controlling control of all defense-oriented activities within the company.

But a most interesting—and promising—part of this new organization, the new Westinghouse Advanced Systems Planning Group (now commonly called WASP), wasn't announced publicly until August.

This was a significant development. Since technology is moving faster than ever before, there's a real need to effectively anticipate what will be needed in 5 or 10 years. If this can be done, long-lived defense systems can be developed more quickly and substantial sums can be saved. WASP should be able to provide the advance thinking needed by Westinghouse to meet this need.

Staffed with hand-picked engineers and scientists—specialists in electronics, atomic space, atomic power, ASW, operations research, etc.—and headed by Allan Chaffin (top center photo above), WASP operates on a unique charter to concern itself primarily with



MATCHING NAVAL REQUIREMENTS with Westinghouse engineers, Ernest Dow, a professional career specialist in naval strategy, tactics, and weapons systems, is accelerating advanced technology to future naval vessels.



"The idea is good, but how can we have it done better up? Present facilities won't work. How about others? And what? How they won't work either in this case."



"What's the best way to destroy an enemy reconnaissance satellite? Attack it from north? Or from another satellite? How would we go about either method?"

complete advanced weapons system, to deal with the "whole" instead of "parts."

This is not just a "blue-sky thinking" assignment. Westinghouse believes future defense needs will be so complex that only a full-time team of specialists—like WASP—will be capable of the kind of conceptual planning and guidance needed.

There's another reason why defense planners will be interested in WASP. This new group gives them a single point of contact within one of America's largest and most versatile industrial firms to which they can take immediate and long-range defense problems. No longer will it be necessary for someone

to try to guess which Westinghouse division is best equipped to tackle a given job.

This is a bigger advantage than might be apparent. A newly-published capabilities chart*, for example, lists 32 different Westinghouse facilities and, for each, indicates specific study, design, or manufacturing capabilities in 32 different areas (air-in-aid, rocket powerplants, torpedoes, guide base equipment, etc.). That same chart lists 16 Westinghouse facilities which can handle system analysis and 7 capable of complete system management.

*Available to qualified individuals and firms upon request.



"...We'll order the north of 18,000 miles on line." Space researcher, E. S. Saperstein, a Ph.D. from Yale, keeps WASP and other company specialists abreast of space needs like an on-substantly an atomic, hydrogen, and chemical rocket concepts.



TOP ENGINEER AT WASP. Ben-Gurion joined Westinghouse in 1951. Among other accomplishments, he headed the engineering group responsible for the design of the first American turbojet engine for aircraft.



"Could we deflect enemy ICBMs by sending them false signals at the time of launch? If so, could the be done from distant locations? Could this be done automatically from remote-controlled stations?"



WALK ON THE MOVE. Dr. Saperstein has his sights on tomorrow's systems and provides guidance for WASP in planning for future Department of Defense needs.

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LEAR

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OBJECT'S POSITION can be computed from point of maximum rate-of-change of equal frequency and its relation with time

tion facilities. The technique does have an advantage in that it is not possible to determine whether the receiver transmitter is to the left or to the right of the satellite's path. If the satellite were attitude-stabilized directional antennas could be employed to resolve this ambiguity.

To make these measurements and determine Space Electronics Corp. response to receive the satellite with a stable crystal oscillator plus another oscillator which is phase-locked to the satellite's very narrow band carrier. In determining these two oscillators a beat frequency is obtained which varies as direct proportion to the doppler frequency variation of the signal it carries from the microwave horn transmitter.

Tap Recorder

The signal will be recorded on a small tape recorder aboard the satellite. The stable crystal oscillator will provide a time base reference which is recorded on tape in synchrony with the exact instant when the satellite was at the closest distance to the microwave transmitter.

When the satellite subsequently comes within radio range of an earth-based station, it will be interrogated by the station and will transmit the data it has previously stored on tape. The name of the station is then quickly computed, the position of the microwave transmitter and satellite must occur at the same time.

The amount of the earth's surface that can be scanned by the search receiver satellite is a simple calculation depends upon its orbital altitude. For example, a 300-mi-high satellite could scan 14% of the earth's surface in about 95 min. A satellite at 1,250-mi altitude can scan approximately 65% of the earth's surface in 125 min, according to Space Electronics Corp. calculations.

If the satellite were placed in a 300-mi equatorial orbit, for example it could scan all of the area between 21.5 deg north and south latitudes in a

single 95-min orbit. A 1,250-mi-altitude satellite could cover the same area four approximately 40.5 deg north to 40.5 deg south latitude.

Accuracy in which the search object can be located depends largely upon the short-term stability of the crystal oscillator in the satellite, and in the microwave transmitter as well as on the geometry of the problem.

A preliminary accuracy analysis based on simplifying assumptions such as a circular orbit, equatorial ascending orbits, for a satellite at 300-mi altitude indicates errors of the order of one mile for most situations. For example, if the search object is 1,500 mi on either side of the satellite's orbital path, the error in determining its down-range position (measured along satellite path) would be approximately 3 mi. Estimated error in determining the search object's position above or below the satellite's path also would be about 4 mi. Space Electronics Corp. estimates.

Power required for the search-receive satellite would be quite modest because the receiver operates via solar cells. A battery supply is required and then it has data to transmit to a ground station.

The company points out that the search-receive capability can be built into satellites designed for other primary functions to perform such as reconnaissance or navigation.

Techniques required for a search-receive satellite are well within the current state of development, the company says, which will permit specific construction of feasibility models. The next phase suggests the technique could be evaluated by placing satellite equipment in a jet airplane, and the microwave transmitter on the ground. Previous company thinking about this technique at about 700 mi should be suitable for the microwave transmitter.

Space Electronics Corp. founded about a year ago by former Space Technology Laboratories, also is exploring the feasibility of using sub-orbital electromagnetic waves, or earth currents for military communications. (ENR May 18 p. 35). The company is a subsidiary of Pacific Aerospace Products, Inc., Glendale, Calif.

Nuclear Device Blasts Damage Rabbit Retinas

Washington—Two high altitude nuclear explosion—designated Tank and Orange—caused retinal damage to rabbits placed up to 500 yards from zone and seriously damaged communications at distances up to 1,500 mi. Atomic Energy Commission reported.

The nuclear devices were exploded at 700,000 ft (Tank) and 100,000 ft (Orange) over Johnston Island, a coral

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For the Hornet Dog's jet engine drives it at supersonic speed to a target hundreds of miles away. Its self-contained inertial navigation, set before launch by the F-55G crew, can't be jammed, can't be deceived.

The GAM-77 Hornet Dog program got underway in August, 1967. The missile is already in its flight test phase. Thanks to accelerated development, it will be deployed by 1980.

SAC's and ARDC's "blue-air" integration programs further speed the Hornet Dog's operational status. As every other air-to-air missile comes off the production line, half the crew assigned to it is from the Air Force.

The Missile Division of North American Aviation is weapons system contractor for the GAM-77 Hornet Dog.

MISSILE DIVISION
NORTH AMERICAN AVIATION, INC., GARDEN CITY, CALIFORNIA



fell located about 700 mi. southwest of Honolulu, Hawaii. Astronomers Wirtz previously reported that the incision was about 300 ft deep, an excavation of the upper atmosphere at a range of 1,500 mi. from ground zero (AVF May 18, p. 54).

Reconnaissance projects conducted during the shots showed that very high atomic nuclear explosion can be "particularly damaging to the eye" because of the rapid rate at which the power pulse delivers thermal energy, and the relatively low atmospheric attenuation cross-section, APC, said.

From bases on the rabbits, scientists said, were about 2 cm in diameter at about 40 mi. distance, decreasing to 0.5 mm at 300 mi. said.

However, intensity of thermal radiation at ground level was insufficient to produce first degree burns in human beings, according to the AEC. Radiation was measured at the firing point.

In testing effects of the detonations on radio and radar transmission, scientists found that the explosion so disturbed the upper atmosphere that radio waves were absorbed or scattered. Measurements were obtained from two stations (relative ionospheric conductivity) The instrument recorded serious absorption at Johnston Island beam after Test, was fired.

During Test, scientists working nearby frequencies experienced similarly different degrees of blackout and some channels were operable at all times.

After the Orange detonation, the scientists noted, major ionospheric effects were delayed until after sunrise, when reportedly the sun's radiation caused photo-dissociation of the remaining negative ions. This created a quiet ionosphere in ionosphere and absorption of the lower levels of the atmosphere.

First measurements made by remote video at the path's surface at Johnston Island showed that waves were insufficient to cause structural damage or break window panes. Both devices were covered cloth by Redstone missiles.

Fairchild to Test Anti-Collision Device

Fairchild Aerospace Division is preparing to flight-test its anti-collision device, called FADAR (Passive Detection and Ranging), for the Federal Aviation Agency and the Air Force under a \$18,040 contract.

The FADAR system requires the cooperative utilization of a radar transmitter which sends a signal that is received over two paths, the line of sight path and the ground reflection path. Measurement of wave differences between the arrival of the two signals gives range and rate of closure between the craft that are both equipped.



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SAFETY

Sayen, Quesada Debate FAA Cockpit Rule

(Because of wide interests in a controversy as to taking on flight duties and responsibilities of airline pilots, Steven W. Sayen is presenting an exchange of correspondence between Clarence N. Sayen, president, Air Line Pilots Assn., and E. R. Quesada, administrator, Federal Aviation Agency. Sayen's letter is followed by Quesada's reply.)

Dear Mr. Quesada:

A delicate situation involving, respectively, the Federal Aviation Agency has been brought to my attention and I am writing you requesting it be recognized that only qualified pilots will be fitted.

As the problem is reported to me, in opinion of the Federal Aviation Agency (and I understand that is what you think) is definitely aerial navigation is insufficiently competent, while many of our best pilots are being lost to the cockpit as a result of the FAA's policy. The FAA's policy is to let pilots fly who are not qualified to do so. This is a very serious situation and it is my hope that you will take steps to correct this situation.

We are aware of your letter addressed to all our pilots on May 1, 1970, asking them to fly the aircraft for the FAA. We are aware of the FAA's policy of letting pilots fly who are not qualified to do so. This is a very serious situation and it is my hope that you will take steps to correct this situation.

Therefore, I respectfully request that the FAA, in its policy of letting pilots fly who are not qualified to do so, take steps to correct this situation.

Because of wide interests in a controversy as to taking on flight duties and responsibilities of airline pilots, Steven W. Sayen is presenting an exchange of correspondence between Clarence N. Sayen, president, Air Line Pilots Assn., and E. R. Quesada, administrator, Federal Aviation Agency. Sayen's letter is followed by Quesada's reply.)

Periodic Visits

Let us make, for a moment, the ridiculous situation in which we find ourselves. The pilot in command has a statutory responsibility for the safety of the flight. The FAA, on the other hand, has a statutory responsibility to issue pilot licenses to anyone who meets the minimum requirements. The FAA's policy is to let pilots fly who are not qualified to do so. This is a very serious situation and it is my hope that you will take steps to correct this situation.

I would also like to bring to your attention that many of our best pilots are being lost to the cockpit as a result of the FAA's policy. The FAA's policy is to let pilots fly who are not qualified to do so. This is a very serious situation and it is my hope that you will take steps to correct this situation.

line and only should the aircraft ever under such conditions, only with the pilot in command.

Time limits had had the effect of a new regulation. However, it has been done in a general manner and you have not defined your terms. You have not specified the minimum time that can be spent in the passenger compartment, how many trips can be made in the passenger compartment while in a portable toilet for cleaning the passenger compartment or the more, other factors, such as this. I hope that you agree with such a provision and, in fact, you agree with such a provision to the pilot's judgment. But the representatives of the FAA are attempting to apply some sort of exact measurement to this personal rule and to substitute their subjective idea of the pilot's judgment in the cockpit and such judgment of other people is an even greater problem.

With all the many safety problems that are involved in the industry, the FAA's policy is to let pilots fly who are not qualified to do so. This is a very serious situation and it is my hope that you will take steps to correct this situation.

We have long concerned in the industry of having two qualified pilots on the flight deck at all times and not have single pilots on the flight deck. This is a very serious situation and it is my hope that you will take steps to correct this situation.



Braniff 707-220 Makes First Flight

Braniff International Airways' first Boeing 707-220, making its first flight at Boston, Mass., on the first of the 707 series to be produced by Pratt & Whitney T44 turbojets, total it over 35,000 lb. (total only). The 707-220 is powered by JT4C turbojets rated at 15,000 lb. thrust each. The more powerful engines are expected to give better performance at Braniff's South American route since whose high temperatures and high altitudes conditions are encountered. Gross weight of the 707-220 is 240,000 lb. Maximum cruising speed is 600 mph. Braniff expects to take delivery of this aircraft the first of five in October.

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ation and the accident scene by your inspection. We have pointed out to you that under your present regulations, only the pilot in command of the aircraft is required to be qualified in the particular aircraft being flown. We have especially requested that the regulations be revised to ensure that the cockpit also be qualified and provided with a type rating on the particular aircraft to which he is assigned and that he be given the appropriate basic, periodic, training. "We have pointed out to you that if something should happen in the pilot in command, under the present regulations, no one could the cockpit is not required to be able to fly it off. While we have been taking positive steps to provide protection for the training public in those areas the Federal Aviation Agency has those 380's in making.

We would also like to point out once again that dead passengers, dead birds, dead things the windshield, and many other serious accidents can completely incapacitate the pilot in command and that under your present regulations no protection for the passengers is afforded. An accident has to be the pilot in command in the passenger cabin to carry out his duties responsibilities in the least of concern. We have asked for certain problems in the entire crew qualification and training area, in the air traffic control area, in the mechanics of air space, as ground the pilot in command with adequate tools with which to work including airborne radio to ensure that the current training program are adequate, and it more, other major safety area. You are still presenting under the federal regulations, a two pilot crew to fly any 12 in a situational emergency. In other words, those two pilots can be scheduled to fly at aircraft for 17 run times have a 6,000 in or more, before what. If the actual flight time, correct the schedule, under the regulations we are talking, the two individuals can find those who deal with flight emergencies larger

than 12 in. Now you can see that are supposed to mean continuously strapped as they are flying.

Our liability and insurance system are not that good. We cannot as the pilot is completely aware of the necessity of having in adequate crew on the flight deck at all times. He is also aware of his responsibility in the passenger cabin and of the security that he maintain himself in an alert and healthy condition. Your comments on the subject was brought to the attention of our senior lieutenant. The children's College program was in operation living to reduce this concern to a rigid rule is a complete waste of the taxpayer money which could well be spent in other ways.

If this is an example of how the FAA intends to devote its time and energy, we have real problems on our hands. I hope that this is not true and that you will take prompt action to see that this problem is resolved.

Quasada's Reply

(Following is the text of Mr. Quasada's reply to Mr. Byrnes.)

Dear Mr. Byrnes:

I have withheld reply to your published address letter of May 15 in order to attend the House Judiciary to let one citizen provide another. Much in 1 degree what appears to be a colorful rhetoric of this Agency and its superior personnel. I am most concerned over the possible adverse effect upon public confidence. By request, as you have that your members be exempted from endorsement of regulations that require pilot registration, per note that active pilot's rate convenience more than the effect of passengers and below aviation.

Surely this could not have been the result of some observation of the Civil Air Regulations requiring flight crew include a to attend these day sessions. Denote your responsibility to the transportation in use this way. I believe it necessary that they be resolved peacefully, and that the time be

beneficial to many faces. If aviation is to prosper, it is essential that the public have confidence in the safety of all flight crew, both civil and military. It is essential the public understand that such confidence is not given. It is essential the public understand how deserving such pilots are of the trust, respect to them. And finally it is essential the public understand that this Agency will not be threatened into retreat from the responsibility it bears for doing all within its power to prevent a repetition of those major collisions which shocked the nation and brought grief to hundreds of American families.

I do not doubt your right to challenge the actions of this Agency any more than I challenge your right to dispute any all administrative judgment. Had you presented evidence of noncompliance on the part of any suspicion, I would have been happy to investigate and take initial action to remedy those inadequacies and generally, of achieving and expediting conduct in the performance of their public duties. If you genuinely believe this to be true, I would stand you that the law clearly gives you access to the courts for relief.

The Congress, as you know, has now announced the Federal Aviation Agency has defied the public interest, and is providing for the safety of the lives of the public. As long as we are charged with this responsibility, we shall continue to provide, in accordance with our own regulations as well as ensure the protection of human and civilian life and property. And, as long as such regulations exist, we shall enforce them with the diligence they deserve.

As I mentioned at, you object to coloration, but, regardless of the Civil Air Regulations which now reads as follows:

"All required flight crew members shall on flight deck duty shall remain at their respective stations while the aircraft is taking off or landing, and shall remain in their seats or at their respective stations until the completion of the landing. All flight crew members shall keep their seat belts fastened when at their respective stations."

The rule specifically to say that at May 1, 1979. In a I called to the attention of passengers at the station the result of the requirement. Several letters were sent to the Secretary of the Army, the Navy and the Air Force as well as to the several organizations representing the private and corporate industry. In each of these letters, I appealed for accurate pilot regulation and strict observance of the requirement. You are the only one who has objected.

The support of the others in my appeal is indicative of general concern over the need for uniformity and uniformity. Under no circumstances can develop such an effective, that the human eye in the evidence of an individual's "see-no-evil" principle, which is the principle applied and is publicly admitted.

Three men, as you know, some 12,000 others, are 70,000 people across the globe, are the only ones who are the pilot of these 92,000 aircraft have the right to demand that "let us see" not only to each other but to the pilot of the



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Now you have learned that an letter of Mar 3 '74 has had the effect of a new regulation. The Civil Air Regulation which I cited had been in force since April 1, 1954. Not so much as a means had been changed. Aside from that regulation, Part 41 7501 of Civil Air Regulations were the same requirement for flight over populated with equal issue. It has been left since Dec 31 1975. Your position is clear.

Therefore, von Elitz, who Federal Aviation Agency inspectors are being ordered to inspect for flight deck, for an aircraft whether

The inference here is that we have been unreasonable in our enforcement of the regulations. Your statement forces me to cite two cases in which we have taken action against flight crew members for violation of this rule. In citing these cases, I wish to make it clear that I do not compare the conduct and competence of our professional entry pilots and their crew members. These cases represent exceptions to high standards that exist within pilot here at Los Angeles.

The first method of a near miss between a DC-7 with 55 passengers aboard and an Air Force tanker engaged in the refueling of two fighter aircraft. The Air Force aircraft was, as the report, and consequently, lost the right of way according to Civil Air Regulations 60.19. They had landing lights, crossing lights and refueling lights burning. The DC-7 had its crossing lights

Planning. The pilot of the test set was the DCT at a distance of 1200 m. The evidence of over burning was the Air Toxic Unit (Attoxic) readings (which said the pilot of the DCT was in the passenger cabin for 10 minutes). The test set was designed to measure the performance of the pilot of the DCT as provided for in the Civil Air Regulation in which no pilot, 3rd or 4th class, is to be in the cabin of a transport aircraft in flight.

The DOT has the option of paying or forcing us to take the case to court. In fact, the leaders of previous tax collection protests have been arrested since their rights are false promises.

This case also involved a 787 jet transport with 119 passengers aboard. In this instance, the aircraft was diverted from its scheduled flight at \$10,000 a hour to the North Atlantic. The aircraft pilot filed and damaged and the aircraft proceeded unharmed into a descent to land in

There is often a tendency for those who are unconvinced by evidence to vent their accusations against the public media. It is important to remember that officials charged with the conduct of government hearings must share information so that we can meet the needs of our country; however, it is not our responsibility to disclose to public service. I shall vigorously defend this Agency's integrity on any and all occasions where they are subjected to unwarranted attack in the performance of their duties.

Finally, I am concerned by the rate of acceleration which I feel was not reflected upon the vigorous celebration of the voters' regulation on high stock valuations. It has to be a program of non-comparison among various parts of the world, but in general, I would have felt that the program was a program of comparison rather than a statement of intent.

As you are aware, the suspect had failed to show before the previous onward passage of the airplane. It had failed also on the Euro-London leg of the same

A failure of the automatic pilot causes a warning light to flash on in front of the

phets said. On the one extreme, however, the warning went unheeded. The pilot sent was simply investigated, disclosed that the pilot had withdrawn to the passenger cabin for reasons not necessary to his normal duties. A crew member was leveled against the captain and has been paid by him. That he was disarmed, extra

...and still is getting back to the light, dark is best to reduce the stress a lion could have experienced in getting caught in a den.

The same has been described further in some allegations that violence against women being kind against people who have the right to do that. It is not about their own bodies. This is an shared condition and if believe you know, if you can see an evidence in effects on respecter but less evidence on masculine, I shall be glad to investigate and take each concrete action as they be required.

Throughout the text of your letter you have paid out of your way to disparage the professional competence and integrity of the inspectors of the Federal Reserve.

USAF Plane Crashes Decline Since 1955

Los Angeles—USAF aircraft accident rate has declined steadily since 1955 despite the increasing number of hours flown in high performance aircraft.

Mr. Gen. Joseph D. Callahan, reporting here for a new assignment as USAR deputy assistant general for affairs (AW) June 15, p. 21) and the number of fatalities totaled 369 in 1955, but rose again in 1956 in 1958. If the trend indicated in first-quarter 1979 continues, the number of fatalities could decrease to less than 200, he added.

The accident rate per 100,000 living lowest is similarly reduced from 4.0 to 2.3 as the first quarter of this year.

Most significant cause of the reduction in the rate is pilot education, although the number of ejections in first quarter 1999 is 55% greater than in 1998, pilot fatalities have dropped, he said. Each year sees a greater number of living hosts in Crews' series fighters with seats graduated pilots becoming the norm, making the record more workable. Collins added:

Fuel contamination is still a major headache in flying salets, he contends, and the Air Force suspects fuel contamination could be a cause factor in some of the underreported crash cases which make up 15% of Air Force flying accidents. One manner in which the contamination problem is being tackled is through continued emphasis to fuel handlers of the importance of their job.

Con Cadden said a large project went on last October equipment is in the office pending the outcome of various tests on each component now. Major emphasis will be removing water in solution from IP-4 and IP-5.

Brig. Gen. Walter E. Arnold will assume Calidam's former post as director of flight safety research, Norton AFB, Calif.

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Fisher solid-propellant rocket engine is tested at Aerojet-General Corp.'s Solid Rocket Plant, Azusa, Calif. (AFW Mfr. 30, p. 75). The engine has four nozzles which control direction of thrust and thrust augmentation. Fourth nozzle is connected by flange.

WHO'S WHERE

(Continued from page 35)

Chargers

Walter Hunsahl, director of manufacturing engineering, Crosby Division, Aero Corp., Cincinnati Ohio. Also Henry Calkins, manufacturing outdoor design.

George E. Smith, general manager, for Media Co.'s Comm. Division, Cape Canaveral, Fla.

Lee Smith, senior captain, Northeast Ohio's Airway, according to Louis DiLugio, retired.

George Casares, senior project engineer, natural gas group, DuPont Corp., Monrovia, Calif., subsidiary of Hercules Chemical Corp.

Frank E. Johnson, R. L. Manufacturing manager, General Electric's Flight Propulsion Laboratory Department, Evendale, Ohio

May, Gus H. Bow, General (USAF) ret., manager of a civil control reform group to handle the Aeronautics Administration contract. Henry F. Hochstadt has been

Walter M. O'Neill, supervisor-contract administration, Special Products Division of Southern California Edison Co., 1900 Main St., San Diego, Calif. 92101.

Robert H. Wood has been appointed editor of Ziff Davis Publishing Co.'s *Flow magazine*, New York, N. Y.

George C. Messersmith, head of the device electronics department, Hughes Aircraft Co.'s Products Group, Newport Beach, Calif. Also, Dr. Michael Wolfson, a senior

Dr. Samuel Korman, head of the Mineral Development Laboratory, Associated with Dr. Korman are: Dr. Robert P. Sadron

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Key words: Culture; capitalization; self-identity; self-esteem



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LETTERS

Editorial Obligation

Kudos to Anthony Mura, and especially to Clarence N. Seyer, for his letter pointing out his subscription because he had "taken just about enough" (AW May 15, p. 134).

To begin with, it is reasonable that you have the right as well as the obligation to speak editorially with courage and conviction on matters of great importance to aviation. Obviously also you must faithfully report aviation news including statements made by spokesmen whose views are diametrically opposed to your own. As a subscriber of long standing and an employee of the editorial staff, I commend you on both counts.

Furthermore, your practice of publishing letters, some of which are extremely critical of your editorial policies, represents one of your unique and do them to enlightening the aviation community.

As president of the Air Line Pilots Assn., Mr. Seyer is certainly disempowering these spokesmen, if not downright embarrassing by causing his subscription simply because he does not like the editorial attitude. On the contrary, I believe that if a person has to be completely wrong of the opinion of the press and the public concerning the ALPA and its policies, he is more accurate to express criticism to the public or better yet by being harder to do a job in the best interest not only of pilots but the industry and the flying public as well.

Perhaps that is why you the aviator who you so fairly blame when they are wronged.

I hope that Mr. Seyer reads this letter perhaps while smoking a perk at a colleague's copy of Anthony's letter and decides to return to the fold.

Walter Mermoreau
Miami, Calif.

Canadian Carrier

I would like to first of all compliment and thank you for the editorial in your issue of May 15 wherein you stated and relate to Canadian aviation's first 50 years.

You are quite correct in stating in your editorial that many Canadian operators are still the lowest outside the United States and in the same connection I would like to point out as p. 96, in discussing Canadian T&E exhibition trips, now refer to us as our own, Pacific Western Airlines, as in Airlines Canada.

While we do have international charter licenses, making us to fly into Alaska from across western Canada partly we are nevertheless a completely Canadian company and, in fact, have the distinction of being Canada's largest independent airline—considering the fact that Trans Canada Air Lines is government-owned and Canadian Pacific Air Lines is owned by the Canadian Pacific Railway Co.

F.A. "Goody" Williams
Press Relations & Advertising Office
Pacific Western Airlines, Inc.
Vancouver, Canada

Aviation Week welcomes the opinions of its readers on the issues raised in the magazine's editorial columns. Address letters to the Editor, Aviation Week, 230 W. 42nd St., New York 36, N. Y. Try to keep letters on the 500 words or less a guideline (double-spaced). We will not print anonymous letters, but names of writers will be withheld on request.

Canada's Air Industry

I wish to congratulate you on your editorial "Canadian Aviation's Fifty Years" (AW May 15, p. 70). I feel this will be a significant contribution to the educational program that must take place if Canada and the United States are to be partners in the mutual defense of the North American continent.

The integration of the USARCAP into the air defense of the continent, i.e., as a component of Canada's Air System in Reply Commanders of NORAD was the initial step of new revenues for the Canadian aircraft industry, to participate actively in the research and development and production of the weapons system to achieve the common goal.

As you point out, the ever increasing complexity of an effective aerospace system beyond the resources of Canada, but most definitely not beyond the capacity of the Canadian aircraft industry. The time has come out for the joint governments in both civil and military fields in the industry.

I am sure the recognition afforded the Canadian aircraft industry by its association with the defense required by American Wars will get added impetus to Canadian manufacturers to increase their activity in selling their products and capabilities to the United States armed services procurement agencies and peace initiatives.

Anthony J. Lorus
Secretary Industrial Council
Air Industries & Transport
Aeros of Canada
Ottawa, Canada

Pilot Study

Not being extensively acquainted with Pilot Section activities, and, Air Line Pilot's Assn. office, the writer wonders if you as one of your readers can answer the following question:
Has an adequate study (or no attempt at such a study) been made to determine which of the following two pilot groups is likely to provide safe pilot ratings?
A. Existing airline pilots who adequate pilot training.
B. Disqualified pilot pilots (especially multi engine) with adequate airline training?

Training problems for an individual of over 50 years of age, with "natural" as opposed to a period of some 20 years, can not be changed off on the basis of operations. Naturally, airlines agencies even both ways, possibly, and even probably, as engineering study would indicate the more

carefully followed by the industry to be correct.

However, one wonders whether that not has had adequate time and effort, without study. The writer is not quite enough to suggest that the subject might be a sound one, just pilots, rather selection on the basis to more than one of the aforementioned agencies. While he is not proponent of this problem, he appreciates even more his own to an active participant.

Steven J. Mann
Dallas, Tex.

F & The writer is not an aviator yet pilot.

Classification Example

I agree wholeheartedly with your recent article on classification and information policies in the Pentagon. As an example of one classification which you did not mention is the following: Four Wheel Drive Corp. of Glensville, Wis., has been working for some months on a \$40 million contract for ground handling equipment for McDonnell, but all information on this has been withheld because the Air Force is still "drinking" the contract.

ROBERT K. MANNING
Phoenix, Ariz.

Profit Renegotiation

Recent events can only add fuel to an argument to your customers to expect to be paid the price as well as the other shareholders' policies long ago subjected our national economy, globalized, etc., at the present Administration and the Defense Department (in particular) attitude toward the war breaching problem of defense. As various events and cases have called for special studies and needed recommendations, as evidenced by the Rockefeller Report, the Galper Report, and now the Kilian Report, serious doubts are generated as to the effectiveness and effectiveness of the job which the National Security Council is supposedly doing.

From the set profits for several months between 1975 and 1976 as an example (AW May 15, p. 25) there can be no doubt but that these profits are very high, however, it is clear that the government of the profits must be made to high it averaged over a 10 year period, a thorough investigation of the highly controversial and important matter of renegotiation would seem to be needed. If no renegotiation recommendation could be arrived at there would appear to be some, due to a temporary suspension of renegotiation the second year of the study, its effects on the efficiency of our system for procurement of weapons, related arms and services. In this regard, though, there does seem to be a growing trend among some manufacturers and exporters to use a gross amount of net return per dollar of sale or per dollar of private gross government procurement rather than the gross amount of net return as a profit standard.

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Cleveland, Pa.



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